THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

Vol. XXII. No. 552.] LONDON, NOVEMBER 18, 1873. [25th Year.] Price 1s.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

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OR
15, MARKET STREET, MANCHESTER.

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JOSEPH COWEN and CO.,
BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they have also been awarded in the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts in the United Kingdom; and orders for Fire-Clay Retorts of all shapes and dimensions, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
Quay Side, Newcastle-on-Tyne.

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THE ALMA WORKS, WALSALL.
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LONDON, 1862.
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PARIS, 1867.
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AT THE
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By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

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PARIS, 1867.

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LONDON, 1862.

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The advantages gained by using this Machine are Accuracy, Economy of Labour, and a Check upon Fraud. The work performed by a man in any given time is shown by referring to the Index.

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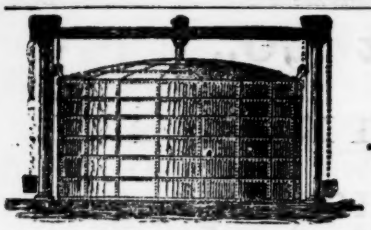
Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.



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SOLE MANUFACTURERS of B. W. THURSTON'S IMPROVED SCRUBBER, CONDENSER, and WASHER, in use in many of the principal Gas-Works on the Continent.

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SLIDE-VALVES,

AND ALL DESCRIPTIONS OF APPARATUS USED IN GAS-WORKS.

PATENTEES AND MANUFACTURERS OF THE

DRY-FACED CENTRE-VALVES,

Which are now so extensively used.

During the last year these Valves have been introduced into some of the large gas-works in London, where they are giving the greatest satisfaction. Favourable reports have been received from the engineers of these and of some of the most important works in the kingdom. The demand for them both for home and foreign works continues unabated.

Every Valve is made with covering bars, to protect ALL the faces. The Patentees found the necessity for this almost immediately after they commenced the manufacture of these Valves, and they have ever since adopted the practice. The large experience they have gained has also enabled them to introduce several minor improvements in the construction of their Valves. It is an advantage peculiar to these Valves that the covers can be easily raised, the faces cleaned and oiled, and kept in perfect condition. If managers of gas-works will periodically attend to this, the Valves will be as good after twenty years use as when first put in.

Messrs. COCKEY AND SONS have been very successful in the erection of many gasholders, some of very large size. They erected, in 1871, at Dublin, for the Alliance Gas Company, one of the largest in the kingdom; telescopic, 182 feet 6 inches diameter. It was referred to by the Chairman of that Company the following year, in his report to the shareholders, as having been in use, and working most effectively, since its erection, and being in the highest degree satisfactory to the Company.

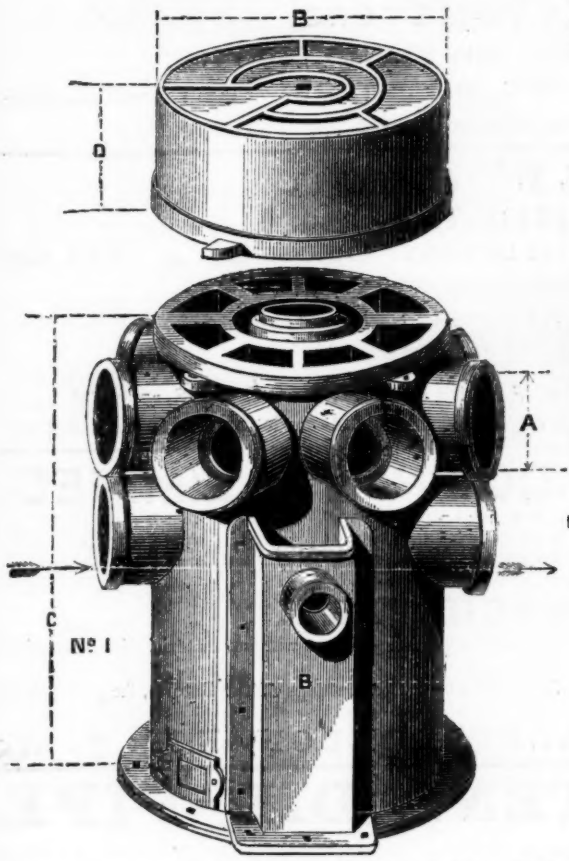
Plans of gas-works are carefully prepared, and every improvement which long practical experience can give is introduced into works entrusted to the care of the Advertisers.

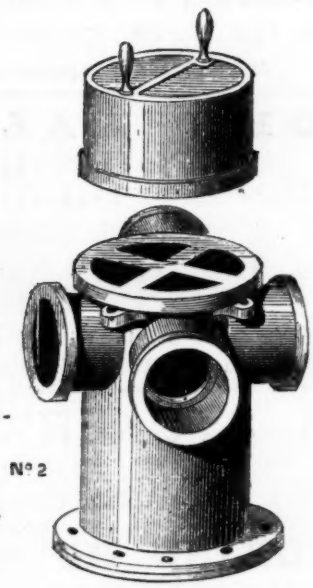
References can be given to the Directors of many Companies who have placed works in their hands, and who will testify to the satisfactory results of so doing.

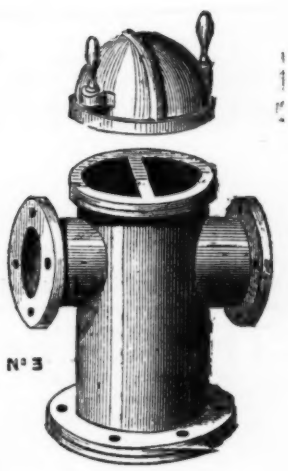
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.







THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

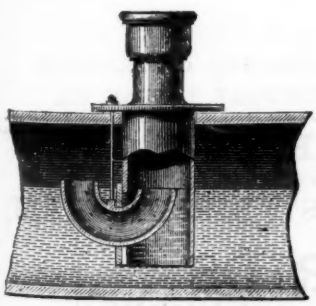
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

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IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

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IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS,

And all kinds of Experimental Gas Apparatus.

JOHN HALL & CO.

STOURBRIDGE,

MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

THE STEAM STOKER COMPANY, LIMITED,

ARE NOW PREPARED TO GRANT

LICENCES FOR THE USE OF THEIR VARIOUS PATENTS

FOR

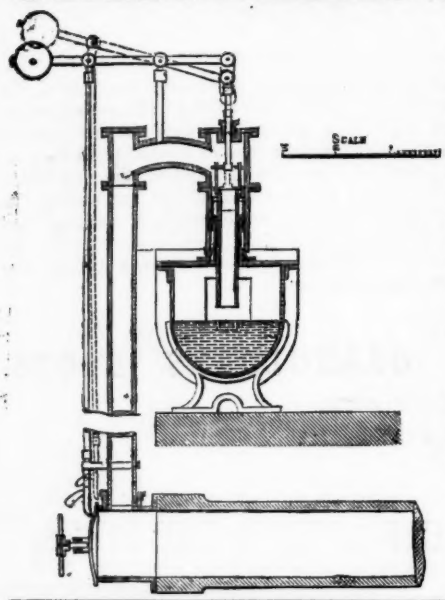
STOKING BY MACHINERY.

Under one or the other of their Patents, Machines can be adapted to almost any existing works without material alteration of the Retort-Houses or Settings.

Applications, accompanied by full particulars as to dimensions of the Retort-Houses, Settings of the Retorts, &c., &c., should be addressed to the Secretary, at the Offices of the Company,

155, FENCHURCH STREET, LONDON, E.C.

CHANDLER'S PATENT DIP-PIPE.



It is well known by all Gas Managers that back pressure upon the retorts greatly retards the production of gas, causing a deposit of carbon which keeps steadily accumulating. Such carbon reduces the capacity of the retorts, requires extra fuel for heating, and has to be frequently removed by heavy iron bars, which very much injure the retorts. By the use of Chandler's Patent Dip all these evils are entirely remedied. When the retorts are being drawn and charged, the Dip-Pipe is sealed in the fluid of the hydraulic main. As soon as the lids are replaced, the Dip is raised completely out of the fluid, and the gas passes unrestricted to the holders. By running the exhauster to a level gauge, ALL PRESSURE IS REMOVED FROM THE RETORTS. The consequence is that there is no deposit of carbon, no need of scurfing, no extra fuel is required, a large saving of wear and tear and loss of time is effected, and a greatly increased production of gas per ton of coal is realized.

The following testimonial letter has been received from the manager of the Erith Gas-Works:—

Messrs. Chandler and Sons.

Gentlemen,—I beg to inform you that during last week I carbonized 18 tons 5 cwt. of Ravensworth Pelaw Coal in a single setting of retorts fitted with your Patent Dip-Pipes, and obtained a yield of 195,800 feet of gas, equal to 10,730 feet per ton, which is a considerably greater yield than I have been able to obtain before using your Dip. The single retort fitted with your Patent Dip, which has now been in use here upwards of four months, has been throughout, and is now, quite free from carbon.

I am, gentlemen, &c.,

Erith Gas-Works, Aug. 2, 1873. (Signed) D. Vincent, Manager.

For terms of use and cost, apply only to the Patentees,

Messrs. CHANDLER & SONS, ENGINEERS AND CONTRACTORS,

YORK STREET, LONDON ROAD, SOUTHWARK, LONDON, S.E.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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MANUFACTURER OF

WOOD GRIDS

FOR PURIFIERS AND SCRUBBERS,

AND

CONTRACTOR FOR GAS APPARATUS & MAIN-LAYING.

TANGYE BROTHERS & HOLMAN,

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SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

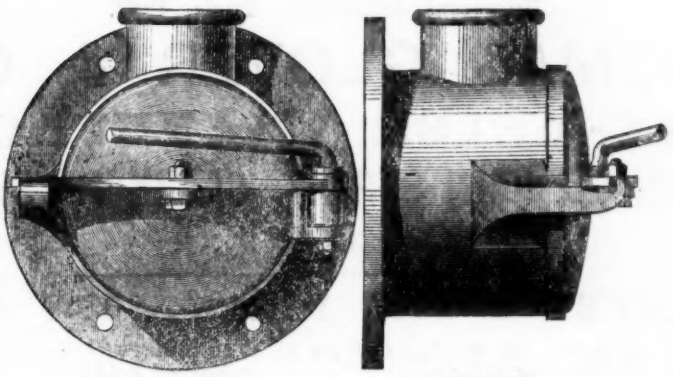
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE ADOPTED BY THE FOLLOWING (AMONG MANY OTHER) GAS COMPANIES:—

The Gaslight Company, Beckton (where over 2000 are in use).
" Gaslight Company, Bow Common.
" London Gaslight Company.
" Independent Gaslight Company.
" Phœnix Gaslight Company.
" South Metropolitan Gaslight Company.
" West Ham Gas Company.
" Imperial Gaslight Company.

The Gas-Works, Royal Arsenal, Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh Gas-Works.
" Manchester Corporation Gas-Works.
" Salford Corporation Gas-Works.
" Rochdale Corporation Gas-Works.
" Liverpool United Gas-Works.
" Birkenhead Gas-Works.
" Birmingham Gas-Works.

The Nottingham Gas-Works.
" Newcastle-on-Tyne Gas-Works.
" Carmarthen Gas-Works.
" Merthyr Tydfil Gas-Works.
" Ystrad Gas-Works.
" St. Alban's Gas-Works.
" Over Darwen Gas-Works.
" Aylesbury Gas-Works.
" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

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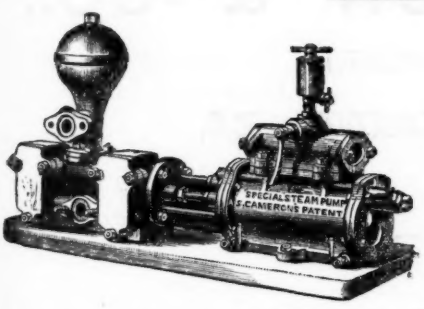
The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.

Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) F. J. EVANS.



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" London "	1	Brentford	1	Eastbourne	1	Middlesborough	2
" Phœnix "	6	Brighton	1	Falmouth	1	Newcastle and Gateshead	1
" South Metropolitan	1	Bristol	2	Forfar	1	Northampton	2
" Western "	1	British Gas, Hull	1	Guernsey	1	Ogley Hay and Brownhills	1
" Alliance & Dublin Coms.	9	" Norwich	1	Henley-on-Thames	1	Oxford	1
Aldershot	1	Burnley	2	Ipswich	3	Plymouth	1
Altona	1	Burslem and Tunstall	1	Jersey	1	Portsea Island	2
Arbroath	1	Bury St. Edmund's	1	Kingston-on-Hull	2	Preston	1
Aylesbury	3	Cagliari	1	Kingston-on-Thames	3	Reading	2
Banbury	1	Cork	1	Leeds	1	Richmond	6
Barnet	1	Darlington	2	Lewes	3	Rio de Janerio	1
Belfast	2						

Rochdale	1	Tonbridge	1
Rotherham	1	Tynemouth	1
Salford	6	Wandsworth	1
St. Alban's	1	Windsor	1
St. Helen's	2		
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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, NOVEMBER 18, 1873.

Notes upon Passing Events.

THE subject of local taxation is, according to the best authorities, to be one of the leading questions of next session—a very difficult question, because the spirit of the age demands all sorts of comforts and conveniences that our ancestors either did not require or did not care to pay for. For instance, there are the expenses of repairing our highways and streets, which in the memory of living men were allowed to fall into tremendous ruts, which were filled up in the rudest manner, the cost being defrayed by tolls levied at gates set up within the limits of every town. Public opinion now insists on streets and footpaths luxuriously paved, and is gradually abolishing toll-gates all over the kingdom. These improvements mean more rates. Our fathers were content with amateur constables and night watchmen, selected because they were fit for nothing else; now the whole country is provided with an urban and rural police of able-bodied men, trained and clothed in the best manner. More rates again. Formerly the great waste in poor relief was in payments to supplement wages; the aged, the imbecile, and the infant paupers were stowed anywhere, and dragged up anyhow. Now poor-houses on expensive plans, lunatic asylums in which no expense is spared, and schools all costly to build, costly to furnish, and costly to manage, are provided for these very helpless classes, at a further charge on the rates. Gaols have been remodelled as well as work-houses and reformatories—a modern invention. In many towns and cities public parks and recreation-grounds have been provided out of the rates; in others, the duty of protection against fire has been undertaken by the governing authorities, all at the cost of local taxation. Then there are the multifarious charges involved in carrying out the entirely modern sanitary regulations, the extensive medical attentions afforded to the pauper or *soi-disant* pauper classes. In a word, every strata of society demands, as necessaries, a number of conveniences unknown in the last century, for which they must pay. The last addition of local taxation is for educational purposes, which includes the costly machinery of School Board elections. In this state of affairs, it being impossible to "have our cake and eat "our cake," while we are not disposed to part with schools, well-kept roads and streets, or poor-houses, hospitals, gaols, lunatic asylums—the best of the kind—or to dismiss our police or our scavengers, there are a good many who would like to shift the burden by transferring a large share of it to general taxation. These are not unfrequently the same parties who also protest against Schedule D of the income-tax if they live in town, and if they belong to the agricultural interest, then they are very keen for the repeal of the malt-tax, which would enable them, they think, to pay their labourers in beer—a wild idea, for the agricultural labourer of the present day is extremely unlikely to accept of sixpennyworth of beer for one shilling's worth of work. We do not deny, however, that local taxation, having grown year by year in an irregular unsystematic manner, is a very proper subject for parliamentary investigation and discussion. It will be odd if considerable numbers of anomalies have not to be corrected, and some economies effected, by a more systematic method of assessing and collecting. But that any extraordinary relief, or extraordinary shifting of burden, can be effected, we very much doubt.

A certain section of agricultural politicians, of the calibre of Sir Massey Lopes and Sir George Jenkinson, have been trying to make an agricultural grievance of the local burdens on land, but apparently with very little success. It is true that Sir Massey Lopes did succeed, two sessions ago, in carrying in the House of Commons an abstract resolution against the Ministry; and that since that victory the local burdens on land have formed the stock subject—almost the *raison d'être*—of the Central Chamber of Agricultural, which comprises on its council a long string of county members, who have made some stirring speeches at agricultural dinners on the manner in which the agricultural interest was "plundered" by a "blundering" system of local taxation. But although the farmers and squires cheered these speeches, it is quite evident that they considered them as unsubstantial as the general stock of agricultural grievances. The recently published balance-sheets of the Central Chamber of Agriculture prove this. The people of England are always ready to back their opinions with a money subscription when they really have faith in them. In days gone by, the Anti-Corn Law League raised £100,000 to support their views, and had more to come if required. The Protectionists, who were not profit-making manufacturers, raised a very respectable amount for agitating their side of the question. The Nonconformists have always been ready with their thousands and tens of thousands when their mettle was up. The licensed victuallers have banked a very handsome subscription to protect the interests of unlimited drinking. The total abstainers and the Permissive Bill advocates have backed their opinions with very large sums of money—a true English mode of showing earnestness. We have always considered that he was a good specimen of an Englishman who, when a social party were deploring in high-flown terms the destitute condition of an unfortunate friend, interrupted a pathetic speech by saying: "You are all very sorry, I dare say; but I am sorry to the "extent of £10. Please to say how much the grief of each of you "will come to." But it seems that the reforms of local taxation, tenant's tenure, and the Game Laws, have produced subscriptions of something less than £500 for the last year; that the council are in debt some £80, and that earnest appeals have produced as yet no metallic response.

The Game Law grievance may be packed into a very small compass. The real part of it has every chance of being shortly removed, because the reform is supported by an outside public opinion. It is universally admitted that where ground game, rabbits, and hares are preserved, high farming is impossible, and that a rabbit is as mischievous as a rat. High farming is the rule—one may almost say the fashion—of the day; therefore, supported by public opinion, a special law will be passed for exterminating rabbits wherever cultivation is possible, and confining hares to the wild moorlands and downs where they do no harm and afford a good deal of sport. Mr. Besley, who hates field sports for the same reason that Puritans put down bear-baiting, "not because it was cruel, but because the Royalists "liked it," has been writing an article against the Game Laws, in which he accuses the owners of deer forests of sacrificing "one-

"tenth of Scotland to their sport." Geographically he may be correct, but agriculturally the acreage devoted to deer is quite insignificant. Every grievance would be removed if the proprietors of the forests were compelled to fence them in where they border sheeplands. If it be once admitted that a man may not turn wild land into a sheep forest, there would be no reason why all the owners of parks and gardens should not be brought before a committee of public safety, with Citizen Besley as president, and made to show cause why such ornamental ground should not be turned into potato allotments. Such exaggerations seriously impede substantial reforms as a law against ground game.

The alleged cases of typhus conveyed to town by country milk have recalled attention to the want of wholesome drinking water, and, indeed, to the water supply generally in villages. Where no pure spring or stream exists for utilization, the most obvious resource is to store rain water. But this can only be done where the cottages have clean, high-pitched slate or tiles. Thatch will not do at all. Mr. Bailey Denton writes on this subject to point out how power to give a village water supply might be created in a very inexpensive shape by a short clause increasing the powers of the Land Enclosure and the Public Loan Commissioners:

> When giving evidence before Lord Salisbury's committee on the improvement of land, last session, I ventured to suggest that powers should be given to landowners to charge their estates with the cost of collecting water to be afterwards supplied to neighbouring villages. In fact, that landowners having the means of collecting water at a reasonable cost, should contract with the sanitary authorities of villages for its supply. All that is required can frequently be completely done for a few hundred pounds, and, with the advantage of obtaining money for the purpose from the Public Works Loan Commissioners at 3½ per cent., villages may be supplied at a very small cost per inhabitant. A village containing 500 people, and paying 1s. a head, may very frequently obtain water without stint at high pressure, so as to be protected against fire, and secure for the inhabitants a sufficient quantity for domestic purposes.

This suggestion was approved by Mr. Caird, who conveyed to the committee the concurrence of the Enclosure Commissioners for England and Wales in the object. In its report the committee recommended the subject to the attention of Parliament. We believe it is more than probable something practicable and tangible may result from the suggestion.

The Railway Commissioners, appointed under the Act of last session, have commenced their labours. Two cases are before them—one a carrier's complaint of being unduly charged by the London and South-Western Company, which will resolve itself into the construction of certain clauses in Railway Acts. The other is of more general interest. The town of Dover complains that the two railway companies favour Margate and Ramsgate at its expense:

> For instance, the price of a first-class ticket to Ramsgate, which is distant from London 79 miles by the shortest route, is 10s., whereas to Dover, distant 78 miles, 20s. is charged. Again, passengers to Dover are charged express fares, whereas those booked for the other towns, but travelling as far as Ashford in the same train, are only charged at the ordinary rates of the cheap fast trains. The second count in his application was the undue preponderance of trains running to Margate, Ramsgate, and Hastings, as compared with those to Dover. By a reference to the time-tables it was seen that, with the exception of the express and the boat trains, only one ran daily to and from the latter town, starting in each case at an hour, at this season of the year, of great inconvenience; while, on the contrary, between London and the other towns, the South-Eastern runs daily two ordinary trains and three cheap fast trains, which are in reality expresses, which number is still further increased on Saturday; while the London, Chatham, and Dover has ten ordinary trains running, besides three of the same fast cheap trains, which, as on the other line, are increased by one on Saturday.

The results, if the commissioners have any jurisdiction in this matter, may be curious and not altogether satisfactory. The fares to Dover are at present under the maximum authorized by the Acts constituting the South-Eastern and the London, Chatham, and Dover. The fares to Margate and Ramsgate are regulated by the competition of steamboats, and the number of trains by the demand of a traffic entirely different from that of Dover. Suppose the railway companies were to meet the complaint by raising the fares to Margate and Ramsgate to the Dover level, how would Dover be benefited? Suppose, on the other hand, they lowered the Dover fares to the Margate level, and increased the trains, and at the end of the season showed a balance of empty trains to Dover—what then? Can railway companies be made to run trains at a loss? Until Dover, the genteel, has the bathing conveniences, strand, and air of Margate and Ramsgate, it cannot have the traffic. We shall wait with curiosity the report of the commissioners.

A cry from the representative of railway servants explains a good many accidents:

> I could give you cases of engine-drivers and others working considerably over 100 hours in a week, but I will only trouble you with a statement of the ordinary week's work of a Great Western goods driver, and would ask your readers to particularly observe the interval between his going off duty and coming on again, and to remember that in that interval he has to go to and from his home or lodgings—which will not be adjoining the station—to wash himself and get some food; and then let them calculate how much time he will have to devote to sleep before he again betakes himself to the footplate. The driver in question finished his previous week's work on Saturday, the 25th of October, at 5.30 p.m. He came on duty on the Sunday morning at 12.45, and went off at 4.30 p.m. On Monday he had a "shed day." He came on at 9 a.m. and went off at 1.30 p.m.; on again the same evening at 6, and off at 5.30 on Tuesday morning; on at 4.15 the same afternoon, and off at 4.30 on Wednesday morning; on the same evening at 6, and off at 8.45 on Thursday morning; on again the same afternoon at 3.30 till 5.30 on Friday morning; on at 6 p.m. the same day till 6.15 on Saturday morning; on again the same afternoon till 12.15 on Sunday morning.
>
> Thus you will see that although there are only seven days in a week, the man actually made eight separate days, averaging more than 12 hours each, or 96¾ during the week.
>
> We hear much about the railway companies allowing sleepy goods trains to get in the way of expresses. Do you not think they are responsible for sleepy goods drivers?

Railway shareholders must take the trouble to strike a balance between the cost of accidents and the costs of increased wages—for more men mean more wages—but directors are so hardly pressed for dividends that they require the support of independent shareholders where an increase of wages is the question.

It is pleasant, amid the floods of nonsense poured out by the advocates of the rights of women—

> The female Atheist who talks you dead,

as Dr. Johnson wrote, a hundred years ago—to listen to the commonsense appeal made the other day for the election of women on the School Board of London. There women are in their place—young children and young girls cannot be properly educated without the advice of sensible women. The majority of middle-aged men elected on School Boards have long lost their sympathy with the very young, and probably have never understood young girls at all. It was well observed that there are quite as many girls to be educated as boys.

The *rabidity*—no other word will express the tone—with which the *Echo* falls foul of railway companies, on every possible excuse, has long been notorious. Articles inspired, if not written, by one of the tribes of literary railway officials, continually crop up, dedicated to one natural object—the increase of the power, promotion, and patronage of the Post-Office staff by the absorption of some branch of private enterprise. These views are perfectly legitimate, and not surprising in an active, ambitious mind; but it is surprising that a newspaper, with a reputation for ability, should make statements in support of its theory, which are so much the reverse of true, that they show the grossest ignorance on the part of the writer. Of course, it is out of the question that an intellectual Liberal writer would invent facts to support his inferences. In the *Echo* of the 12th of November is an article on the text of the prosecution by the London and North-Western Railway Company of certain carmen for stealing the goods it was their duty to convey to the railway station from the booking-office. A stranger to Post-Office larcenies, on reading this article, would never believe that the Post-Office is as fine a field for larceny, petty and great, as any in London; that from time to time postmen and clerks are convicted of appropriating the contents of letters, unregistered and registered; and that, into the bargain, a good many robberies are effected, the authors of which are never detected, until some *test* letters have been craftily prepared and distributed like ground bait for barbel. It was only the other day that an impudent thief declared that the Post-Office authorities could not expect honesty for 17s. a week! The out-door servants of the Post-Office are in a chronic state of discontent on the work and wages question. But it would be very unjust, without further evidence, to blame the governing authorities of St. Martin's-le-Grand for not devising perfect plans for protecting men on the wages of a day labourer from resisting constant temptation. The *Echo* writer begins by stating what is not true, that parcels were delivered safely and cheaply by the old coach system between London and the north of Scotland; but then, probably, he is a near connexion of the ingenious gentleman who carried on a controversy with the late Robert Stephenson to prove that the penny postage could as well be worked out by the mail coaches as by railway trains. As a matter of fact, the parcel business of the old coaches was accompanied by robbery, from one end of the road to the other, on a scale that made the bookkeepers quite independent of their wages. It was not uncommon for a bookkeeper, after a few years work at £1 a week, to retire to a capital public-house. As to parcels, if they did not go regularly by railway, it would be difficult to know how books, newspapers, poultry, fish, and game are regularly supplied from London to the most distant stations, and, according to the tariff that any one may read at the entrance to the Euston Station, on very moderate terms. Switzerland is cited as an example for imitation, where you may send your great-coat by post, where the distances of the whole republic do not exceed in length the main lines of an English county, and where it is as easy for the Post-Office to deliver a great-coat as for a railway to deliver a truck at each of its stations. Let us imagine the condition of the postmen of Kensington and Bayswater, condemned to deliver coats and umbrellas from the City or the Temple, as well as their letter and book-post parcels. To compare England to Switzerland is about as rational and as honest as to draw an example of scavenging arrangements for the metropolis from the rules and regulations of such towns as Leamington or Tunbridge Wells. There is no doubt that "the addition of a parcel "department to the Post-Office" would produce a very large revenue to the State, especially if conducted on Post-Office principles—viz., that people whose parcels were lost or stolen should grin and bear it. The metropolitan railway companies at present collect parcels every evening, which are delivered the next day in Birmingham, Manchester, Liverpool, Sheffield, and Leeds, with all the punctuality of letters, and at very reasonable rates, with this very important condition, that for the value of all ordinary parcels they are liable as common carriers, and for parcels of extraordinary value they are also liable if insured at their value. The romantic writer states, as to the Post-Office, that, "if we have to send anything valuable, "we can register and have good security that it will arrive safely;" but here his mind misgives him, and he adds, "or, at least, that it "will be able to be traced." The difference between the two systems being that if we register with the railway company they are responsible for whatever is lost, stolen, or strayed; but if a registered article disappears in Post-Office transit, all the payer of the registration fee gets is a printed condoling circular from the secretary of the Postmaster. So the modest proposal of the *Echo* writer is that Government shall have the profit of the parcel post without any of its liabilities. The writer assures us that the thief of a registered letter is sure to be punished. That may be so—it is not our experience; but the owner of a parcel would infinitely prefer to get back the value, as he can from a railway company, to receiving a report of the conviction of the Post-Office thief, who had melted his spoons

or disposed of a gold watch to an insolvent dealer in marine stores. Many persons prefer a well-disguised letter to registration of valuables, experience having shown that registration calls the attention of a desperate man to something worth stealing. What must we think of the candour of a writer who, drawing a comparison between the safety of the rail and the Post-Office, omits the fact that the latter pays neither debt nor costs for letters lost or stolen, or for telegrams missent or not sent at all?

The citizens of London may, at any rate, claim the credit of consistency in their objection to discuss any proposals for any reform. They may take rank with the Eldons, the Winchilseas, the Sir Charles Wetherells of the last generation. The last example has been the total defeat of the Lord Mayor Waterlow and his clerical friends in their attempt to settle a draft scheme for reorganizing the Ward Schools of the City. These schools, attached to City churches, are of various degrees of merit and stability. Some are possessed of large funds in land and securities, with valuable school buildings; some are held in the courts of obscure streets, others on very short leases; some are almost entirely dependent on voluntary subscriptions for their support. A very few are well managed, well taught, and really efficient. The majority are under the charge of masters and mistresses of the old generation, appointed originally for any reason except competency, and often so badly paid that they are obliged to eke out their miserable salaries by other employments. A committee of the Ward School managers has long been engaged in framing a draft scheme which would render the extension of Board Schools into the City unnecessary, and would get the utmost educational use out of funds said to amount to upwards of £50,000. The draft scheme, supported by two most earnest and benevolent clergymen, proposed to abolish the system of clothing or feeding day scholars—bribes once needed, now no longer required, to induce parents to send their children to school—to devote a certain portion of the funds to scholarships for the encouragement of industry and talent, and to substitute for a number of inconvenient, unwholesome school-rooms, three great schools, amply provided with class-rooms and all the appliances of modern elementary education, each school to accommodate a thousand scholars, and to be planted in situations which investigation had shown to be most appropriate centres. Of course the plan included a conscience clause for the benefit of Nonconformist children. Necessarily it swept away a large amount of patronage of petty committees, including bigots, clerical and lay. It was quite open to the ward managers to move amendments—to propose that instead of three schools of a thousand there should be six of five hundred each, that this or that charity should be excluded from its operation. One reverend gentleman, who sympathized with the feelings of the opposition, had sense enough to foresee that if the Ward managers did not reform themselves, the Metropolitan School Board and the Endowed Charity Commission would, sooner or later, take up the work in their own way. But he preached to ears as deaf as the Peers whom William the Fourth dispersed, when fisticuffs had almost commenced in the House of Lords. The draft scheme was unceremoniously kicked out of doors, and once more a brief victory was obtained over common sense in favour of petty power and petty patronage.

Circular to Gas Companies.

In the abstract of the report of Dr. Letheby on the quality of gas supplied to the metropolis during the past quarter, published at page 921, it was said that the gas of the Imperial and South Metropolitan Companies was occasionally charged with "sulphuretted hydrogen." Dr. Letheby writes to say that this is a mistake. The sentence should have read "excess of sulphur." This correction should have appeared in our last, but was omitted by accident.

We are pleased to find the opinion we expressed as to the value of the condenser designed by MM. Pelouze and Audouin confirmed by the testimony of Mr. Reid, the experienced engineer of the Edinburgh and Leith Gas Company, who has visited Paris, and made a personal inspection of the apparatus. Mr. Reid's impressions, with a description and drawing of a beautiful little working model of the apparatus, will be found in another column. We refer to the matter here to point out that the idea of the apparatus is not altogether novel. It seems that in 1869 a M. Alleau designed a condenser which is essentially the same as that of MM. Pelouze and Audouin, the difference being that the former made triangular holes in the perforated plates, and the latter make circular. We have not a complete description of the apparatus, but we fancy the other arrangements must be much alike in the two inventions, the object of both being precisely the same. Our Transatlantic contemporary, the *American Gas Journal*, also recently pointed out that a "dry "scrubber" was patented in the United States in 1871. We have referred to a description of this apparatus, and find that it has nothing in common with the French invention but the object. In the American apparatus the condensation of the tarry matters is brought about by causing the gas after it leaves the hydraulic main to pass first between some close lattice-work, and subsequently up and down a series of pipes in which plates of corrugated iron are arranged so as to divide the volume of gas into separate streams. Such an apparatus would, no doubt, be effective, but the great recommendation of the French condenser is its compactness, and the small space it occupies in relation to the work it performs. One thing strikes us in connexion with the apparatus, and it is that if the condensation be so perfect, and the least condensable hydrocarbons (*e.g.*, benzole) be completely removed, the illuminating power of the gas must be affected.

The question whether the delivery of an index card with the price of gas upon it makes a contract between a gas company and a consumer was raised at the Hammersmith Police Court in the course of some proceedings reported in another column. On Dec. 16 last the Chartered Company issued a notice to consumers that after Jan. 1 the illuminating power of their cannel gas in the former Western district would be increased to 23 candles, and the price raised to 5s. 5d., or such other price as the Board of Trade might approve. Subsequently, at Christmas, an index card was delivered to the consumer with the price 5s. 5d. upon it. The company, of course, sue for the price granted by the Board of Trade, 6s. 3d.; but it was contended for the defendant that the delivery of the card with the price 5s. 5d., subsequently to the issue of the notice of increase, bound the company to the lower price, unless express notice was given. The magistrate seems to think that the objection has some weight, and has adjourned the case for argument.

Our readers will remember that in an evil day the Town and Harbour Trustees of Maryport were induced to start competing gas-works, and do the public lighting of the district for themselves. The results of their operations for the past year are now before us in the published accounts of the district. The gas-works revenue account shows an expenditure of £1461 16s., against receipts of £329 10s. 10d., of which £316 15s. is for lighting quay lamps and pier lights. The balance carried to general purposes revenue account is £1132 5s. 3d., and represents the cost of lighting the district which the Maryport Town and Harbour Gas Company used to do for £292. There is, therefore, a clear loss to the ratepayers of £840. The rate required to meet the deficiency will amount, we believe, to about 1s. 4d. in the pound. The liabilities on account of the gas undertaking now amount to £11,100.

We publish to-day a letter from Mr. Otty, the manager of the Limerick Corporation Gas-Works. The writer objects to the statements we have recently made as to the financial position of the Corporation undertaking, but his letter does not greatly alter the complexion of affairs. Things do not seem to be so bad as they have been represented to us, but it is clear that the works at present do not pay, and are, in fact, a great burden to the Corporation, who are naturally anxious to be released from the onerous duties of competition. We should be very well pleased to see the Corporation dispose of their works to advantage, but what we object to is that they should make the sale of their own works conditional on the sale of the undertaking of the United General Company, who may be disposed to hold on. The proper course to pursue would be to offer the undertaking for sale, and take what it might fetch.

We are able to present to our readers to-day the report of Mr. A. G. Vernon Harcourt to the Board of Trade on the inquiry held as to the application of the Wrexham Gas Company for a Provisional Order to raise the price of gas. We have not yet heard whether the order has been granted, but the publication of this report, as the decision of the commissioner, leaves us free to comment on the proceedings. In the first place, we may remark that much of the inquiry was taken up with matters which need not have been inquired into. The Corporation of Wrexham alleged that the diminution of the company's dividends was owing to an undue increase of capital, and the expenditure of that capital on unproductive works. Now the Act of Parliament under which such proceedings as these are held seems to us to authorize no inquiry as to capital, or how it has been expended. It takes the company as it stands, and simply says that with "a view "to prevent undue loss arising from unusual increase in the cost of production of gas," the Board of Trade may grant an order making an addition to the maximum price fixed by a special Act. The matter to be inquired into, therefore, is the cost of the production of gas. This is further shown by the Board of Trade rules, which require a company applying to make a return of all coal contracts in force, the amount contracted for, the date and duration of each contract, and the price, together with full information as to residuals, the amount of gas made and accounted for, &c. All that it is necessary to know about capital is the amount on which dividend is paid, so as to be able to calculate the sum required to yield a dividend within the limitations of the 7th section. How the capital has been expended has nothing to do with the question. We believe the extensions of the Wrexham Company to have been judiciously made, but if they had been reckless and wasteful it ought not to have affected the issue of this inquiry. Charges of this kind are frequently made by selfish people. We heard something like them brought forward in the Town Council of Swansea not long ago; indeed, substituting the Mumbles for Coedpoeth, a part of Mr. Michael's address at Wrexham might well have been delivered by a town councillor in Swansea.

Again, we believe the Act to be perfectly explicit on another point raised by the Town Council—*i. e.*, the difference between a dividend paid and a dividend earned. The Act says distinctly "paid," and whether or not a part of it came out of a reserve-fund is not to be considered. The most that shareholders can get under the Act is 5 per cent., and the fact that this limit was fixed half suggests a suspicion on the part of the framers of the Act that resort might be had to a reserve or contingent fund to temporarily exaggerate a dividend, with a view to an application. We believe, too, that the words, "two financial years next preceding the application" clearly indicate the period to be taken into consideration in calculating the average dividend, and therefore that the Wrexham Company are legally entitled to make 5 per cent. The 1s. advance they have asked for will scarcely yield the sum necessary to divide 5 per cent., but we are afraid they will not get more, and, as times go, they may for the present be content. If the advanced price of coal continue, further legislation will be necessary in the coming session. We may here remind any companies who are anxious to avail themselves of

the provisions of this Act, that application for an order must be made previous to Feb. 15, 1874.

The Corporation of Dublin propose to offer the Alliance Gas Company 5 per cent. annuities on the paid-up capital for the undertaking. We venture to think that the directors will decline to sell on such terms, and we do not believe that Parliament will entertain a Bill to effect a compulsory purchase under the present depressed circumstances of the company. We hear nothing yet of the Kingstown Commissioners, who would, of course, oppose the Bill of the Corporation of Dublin.

The West of Scotland Association of Gas Managers have issued a report, giving some information and asking for more, on a plan we should be glad to see extended to this country. They publish a list of towns with the names of the gas manager, the annual manufacture of gas, and the price to ordinary consumers. They wish to add the population (which the census returns will give them), the price charged for public lamps, the average illuminating power, and the per centage of leakage. We have often thought that a sort of gas directory, giving these and a few other particulars, would be a very useful compilation. The West of Scotland Association have made a meritorious beginning of the work.

The interest excited by any invention which promises to ameliorate the condition of our industry is shown by the correspondence we have received relative to the process of Mr. Skoines. In general the writers agree with the opinions expressed in our last, to which we have but little to add. The results of carrying the true gases—marsh gas and olefiant gas—over red-hot materials, so far as they are understood, are numerous and complicated. According to Berthelot, marsh gas, when heated, breaks up to give acetylene and hydrogen. But acetylene, at a dull red heat, also suffers a change, and becomes condensed to form propylene, butylene, and amylene; and it may be doubted, we think, whether the balance of these changes is beneficial as regards the illuminating power of the original gas. With regard to the vaporous tarry matters, we know but little about what happens when these are carried to a great heat. Mr. Keates and Dr. Odling, in carrying out Dr. Eveleigh's process, found that a gallon of tar vaporized, and the vapour carried through red-hot materials, yielded but 20 feet of permanent gas. It may be assumed, then, that the uncondensed tarry matters, as treated by Mr. Skoines, will only contribute about 300 feet of gas per ton of coal. This gas, it is true, will have a high illuminating power (25 candles), but the bulk is exceedingly small. We come, then, to the unavoidable conclusion that Mr. Skoines's gas is little more than ordinary coal gas diluted with hydrogen and carbonic oxide, that is supposing the carbonic acid removed. Our correspondent "Chemicus," to-day expresses an opinion which we believe to be well founded, that as much expense in purification will be incurred as with common gas. Another esteemed correspondent, whose communication we do not publish, calls our attention to the patent of Edward Heard (A.D. 1806), who passed raw gas over lime heated in a tube to redness, in order to obtain gas "in such a state that it may "be burned without producing any offensive smell." Heard was a somewhat eccentric assistant of Mr. J. Winsor, and a very good gas chemist in his day. The writer also mentions a patent by Stephen White (No. 11,654, A.D. 1847), which has some features in common with that of Mr. Skoines. The invention was very favourably reported on by the late Mr. S. Clegg and Dr. Frankland, who certified that by its use from 40,000 to 70,000 feet of 12-candle gas could be obtained from a ton of Boghead cannel. It has gone, however, the way of so many other promising inventions.

The local inquiry instituted by the Board of Trade into the merits of the application of the Cork Gas Consumers Company for an increase in the price of gas was held on Wednesday last, the 12th inst., before Mr. A. G. Vernon Harcourt, the commissioner appointed for the purpose, at the Court House, Cork. Mr. Denny Lane, the company's secretary, and Mr. G. Anderson, their engineer, were the only witnesses examined on the part of the company, while Mr. G. W. Stevenson supported the case for the Corporation in opposition. The report of the proceedings reached us too late for insertion in the present number.

PROVISIONAL ORDERS, 1873.

The Provisional Orders granted under the Gas and Water Works Facilities Act, 1871, and confirmed by two general Acts passed in the last session of Parliament, were fourteen in number. Of these seven related to exclusively gas undertaking, six were granted to water companies, and one concerned a combined gas and water company. It may be well to point out that these orders affect the companies permanently, and are in fact to some extent equivalent to special Acts, while those granted under the Amendment Act of last session are only temporary in their operation. The Gas Orders are as follows:—

The *Abersychan Gas Order*, granted to the Abersychan Gas Company, fixes the capital of the company at £8000. Half of this sum is the original capital, the other £4000 is authorized by this order, and the dividend on this additional capital is limited to 7 or 6 per cent. according as it is ordinary or preference. The quality of the gas is to be 14 candles, and the maximum price is 6s. per 1000. This order, and all that follow, incorporate the Gas-Works Clauses Act, 1871. In every case a testing-place is to be provided at the works of the company, to which gas examiners duly appointed under the Act named are to have access. The prescribed burner in each instance is Sugg's New London No. 1, with chimney according to circumstances. The pressure prescribed in all cases, except one which will be noticed, is 6-10ths from midnight to sunset, and 8-10ths from sunset to midnight. A clause common to all the orders exempts the companies from penalty when insufficiency of pressure, defect of illuminating power, or excess of impurity is proved to arise from unavoidable cause or accident.

The *Fleetwood Gas Order* fixes the capital of the Fleetwood Gas Company, Limited, at £14,000, of which £10,000 is the original, and £4000 is additional. The dividend on the former is limited to 8 per cent., and on the latter to 7 per cent. The gas supplied is to have the illuminating power of 16 candles. The maximum price for the current year is to be 6s. 3d. per 1000 feet; for the two years following it is to be 5s. 6d., and afterwards 5s. per 1000 feet. The pressure prescribed in this case is 7-10ths from 11 p.m. to sunset of the following day, and from sunset to 11 p.m. 1¼ inch. An inspector of meters may be appointed by the Fleetwood Local Board, who is empowered to test all meters supplied by the company. The meter-rents the company may charge are 2s. for a 2-light, 2s. 6d. for a 3-light, and 4s. for a 5-light meter. For others the rent may be agreed upon.

The *Ilford Gas Order* declares the original capital of the Ilford Gaslight and Coke Company to be £5000, and authorizes £2500 additional, on which latter only 7 or 6 per cent. may be paid according as the shares are ordinary or preference. The gas supplied is to have the illuminating power of 14 candles, and the maximum price is 6s. per 1000 feet.

The *Leominster Gas Order* fixes the capital of the Leominster Gas and Coke Company at £9000, of which £5000 is original and £4000 additional. The dividend on the latter is limited to 7 per cent. Fourteen-candle gas is to be supplied, and the maximum price is 5s. 10d. per 1000 feet.

The *Midsomer Norton Gas Order* fixes the capital of the Midsomer Norton Gas and Coke Company at £4000, without any special restriction as to dividend. Gas supplied is to have the illuminating power of 14 candles, and the price is not to exceed 7s. per 1000. The undertakers are to cause all tanks for the reception of residual products, and foul lime to be properly covered over; and they are to raise the chimney of their works to a height of 50 feet, if required by Mr. Smith.

The *Monmouth Gas and Water Order* fixes the capital of the Monmouth Gas and Water Works Company at £14,000, of which £7000 is the original capital, and the shares into which it is divided are called A shares. A sum of £3780, which has been expended on works out of profits, is to be allotted rateably in shares among the holders of A shares, to form a class called B shares. The order further authorizes £3220 additional capital, the shares in which are to be designated C shares. On the B shares only 4 per cent. may be paid, and on the C only 7 per cent. Gas is to be supplied of 14-candle power, and the price is not to exceed 7s. per 1000 feet.

The *Oakengates and St. George's Gas Order* fixes the capital of the Oakengates and St. George's Gas and Water Company for the purpose of the gas undertaking at £10,000, of which £6000 is the original and £4000 the additional. On this latter only 7 per cent. may be made. Gas is to be supplied of 14-candle power, and the price is not to exceed 6s. per 1000 feet.

The *Redditch Gas Order*, granted to the Redditch Town and District Gas Company, Limited, declares the capital of the company to be £20,000, without special limitation as to profits; but it is said that the company shall not pay a higher interest than 5 per cent. for money advanced in anticipation of calls. The gas is to have the illuminating power of 14 candles, and the maximum price is to be 5s. 6d. within a mile of the works, and 6s. beyond that distance.

The Water Orders for the most part merely authorize the companies to raise additional share capital and to borrow money.

The *Canterbury Gas and Water Company* are empowered to raise £20,000 by the issue of shares to be called B shares, and to borrow on mortgage of the water undertaking £5000 under the usual conditions. All money raised under this order is to be applied to the purposes of the water undertaking only. The *Caterham Spring Water Company* are authorized to raise £22,000 additional capital, and to borrow £5500. The *Denbigh Water Company* are empowered to raise £4000 additional capital, and to borrow £1000. The *Maidstone Water-Works Company* have power granted to raise £10,000, and to borrow £2500. The *Weston-super-Mare Water-Works Company* may raise £12,000 and borrow £3000.

Communicated Article.

PELOUZE AND AUDOUIN'S CONDENSER.

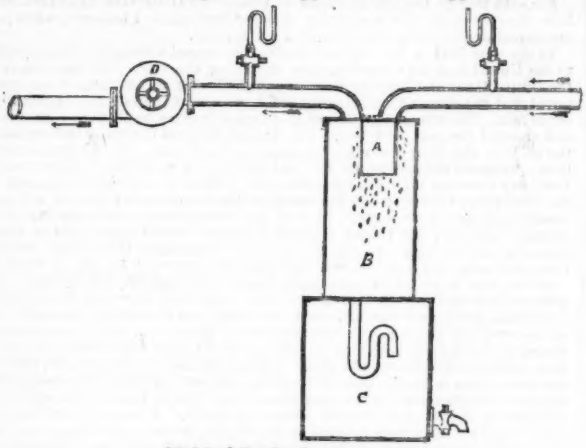
In our number of Oct. 7 we drew attention to the new condenser by Messrs. Pelouze and Audouin, of Paris, and gave an engraving and accompanying description of its construction and principle of action, and expressed our own opinion of the merits of this apparatus in highly favourable terms. We are glad to find a corroboration of our views as entertained by Mr. Reid, of the Edinburgh and Leith Gas Company, who, in visiting Paris in the last week of October, took occasion to visit the works of the Paris Gas Company, situated at St. Mandé, in the north-east faubourg of the city, being nearly the largest of the ten gas stations of the company, where the only example of the new apparatus has yet been erected. Having had the requisite introduction to these gentlemen, Mr. Reid had the fullest facilities afforded him for examining the apparatus, and, on his way home, kindly called to inform us of the results of his examination.

The original apparatus, which had been at work for some three or four months previously, was being shifted and erected on a new and more suitable site in the works, and, being open, its whole interior was exposed to view. The perforated drum shows no appearance of having been clogged up with tarry matters; all that was necessary to keep it clean, after being thrown out of action, was to empty the annular tank and fill it with the thin condenser oils available at the works. The apparatus was as figured in our Journal, and about 3½ feet square outside. The perforated *strainer* or condenser proper was also of rectan-

gular form, and seemed to be unreasonably small in size for dealing with a volume of gas from inlet and outlet pipes of about 18 or 20 inches in bore; but while in action not more than about one-fourth of its vertical surface was required above the lute in the annular tank, and with this area about 350,000 feet per day seems to have been passed while working. Within a few days this apparatus will be charged with the duty of the coming winter, which will quadruple the daily make in summer. It is not intended to supersede the ordinary condensers, but to *follow* them, the gas being previously cooled down to the usual temperature, at which stage of the process the new apparatus comes in most efficiently, and withdraws all floating particles of vapour, whether of a tarry or aqueous character; and at this point is effected those curious results of a chemico-mechanical character which eliminate several of these elements ordinarily dealt with in the purifying department. These are highly spoken of by the resident engineer at the works, and it does not appear that they have been in any way exaggerated, although it was obviously difficult to verify them by a visit of a few hours.

The company have at these works a very beautiful working model of this machine, which was shown in action, the casing being a large cylindrical glass vessel about 18 inches high by 9 in diameter. Attached to the metallic top of the cylinder inside is a little rectangular box, the sides and bottom having triplicate plates perforated precisely as in the larger machine. The holes are about 1·5 millimètre in diameter, or nearly 1-16th of an inch. An inlet-pipe of 1½-inch bore leads a stream of impure gas through the cylinder top to the interior of this perforated box, and an outlet of the same size leads the gas out of the cylinder, also at the top.

In this case the gas was about 120°, and dark brown in colour, as from the condensing-main. On the inlet and outlet being opened, the brown gas and vapour was seen streaming through all the perforations, and the inside of the glass cylinder was immediately filled and rendered opaque by these vapours in their passage through it. After observing this for some time the *outlet*-pipe was connected to a small rotary exhauster or apparatus, by means of which a difference of pressure amounting to 2 centimètres (about $\frac{1}{4}$ or $\frac{5}{8}$ of an inch) was established between the inlet and outlet flow. The effect of this was magical. The brown murky gas inside the cylinder became instantly transparent, and the little jets of brown vapour issuing from the perforations of the box were transformed into numerous beads of clean water, and black clots of tar issuing from all the openings, and dropping in a shower towards a receptacle beneath. This illustrates the effect designed by the apparatus, and is brought about by so ordering the *velocity* of the gas in its passage that it may impinge against the opposing surfaces with due force, by which the vesicles appear to break up and coalesce into confluent drops. This pressure was most carefully noted, and, instead of *two or four inches*, as mentioned in our description as requisite, the actual pressure of best effect was found at what is already stated—viz., about 5-8ths of an inch. It is obvious that, this measure of pressure being necessary, it must be nearly constant. The regulating gasholder above is a necessary part of the apparatus, and effects this object by raising or lowering the perforated *strainer*, so as to fit the volume of gas passing from time to time to such number of perforations as will, by straining through, lose 5-8ths or thereby by the effort. Mr. Reid also visited the works where several new condensers are being made. They are all *cylindrical* in form; the original one at St. Mandé, shown in the JOURNAL, being rectangular. The alteration in form improves the appearance of the apparatus.



Model of Condensing Apparatus.

A. Rectangular box 5½ inches deep by 3¼ inches wide, the sides and bottom having triplicate perforated plates.
B. Cylindrical glass vessel 18 inches deep by 9 inches diameter.
C. Receptacle for liquids.
D. Exhauster.

Correspondence.

GAS PURIFICATION IN LONDON.

SIR,—I am very glad on my own behalf, and I hope also on behalf of your readers, that you have not seen fit to acquiesce in Mr. Trewby's desire to close the correspondence upon this subject. I desire only that the truth should be made known, and that the points in question should be removed from the sphere of mere general allegations, and be brought to a definite issue.

Firstly, as to Mr. Mann's patent, dated Dec. 2, 1871. I venture to think that hardly any better proof (taken *per se*) of the originality of my process of working lime purifiers could be desired than that supplied by the patent of Mr. Mann. He claims his patent rights on the ground that what he proposes to do has, although tried, never been done by proper or adequate processes. Well, what is it that he proposes to do? He seeks to produce sulphides of calcium in a single lime purifier, by passing through it crude gas (gas purified from ammonia in the scrubbers, but containing sulphuretted hydrogen and the other sulphur compounds) in such quantity as to convert the lime in this particular purifier into sulphides of calcium. He does not specify what the quantity is to be, nor does it matter, for in whatever *quantity* the gas be passed into this one lime vessel, the result cannot possibly be the conversion of the lime into sulphides of calcium. For, as the entering gas contains from two to three volumes of CO_2 for one volume of SH_2, and also as the CO_2 has a greater affinity for lime than SH_2 has, the result must be that, at the best, only *one-third* or *one-fourth* of the lime in this single vessel will be converted into sulphides of calcium, the remaining *two-thirds* or *three-fourths* of the lime in the said vessel being converted into the inert carbonate of lime. Moreover, no tests or other indications are prescribed to show the proper time for shutting off the gas from this purifier; and if this shutting off were not done at exactly the proper moment, there would be no sulphide of calcium in the purifier at all, the small quantity of sulphide which could be produced by Mr. Mann's process being rapidly desulphuretted and converted into carbonate of lime by the CO_2 in the gas. Thus, by Mr. Mann's patent, only a very small, and practically insignificant, portion of lime would be converted into sulphides of calcium, *at the best;* and if care were not taken, by the testings which I so fully describe, but which he does not even allude to, there would be no sulphide in his single lime purifier at all. In short, although I have an abundance of direct evidence on the point, not only the vast superiority, but also the originality, of my process is made manifest by this patent of Mr. Mann.

Secondly, as to Mr. Anderson's letter. During the few years I lived in, or on the verge of, the great world of gas, especially during the latter half of that period, I could not but mark Mr. Anderson as one of the very foremost practical investigators in the unknown, or at least uncertain, field of efficient gas purification. And in my pamphlet I have expressed my opinion that, owing to the improvements devised by Mr. Anderson, the old form of ammonia purification by washers has again become the best, whether as regards economy or efficiency.

The chief points to which he calls my attention are the following:—He says that although "there can be no doubt that Mr. Patterson improved the purity of the gas at Beckton," good results in sulphur purification had been obtained at other works in the kingdom "empirically," by hap-hazard or rule-of-thumb. As daily official testings are in use only in London, it is difficult to say to what extent good results in sulphur purification were obtained "empirically" in other parts of the country, although such results probably were perfect excellence compared with those at Beckton, where the entire system of purification, from the time the gas left the hydraulic main till it entered the gasholders, was the most monstrous blunder, and exhibited the most unparalleled ignorance in purification in the annals of gas-making. But surely, as I think Mr. Anderson will freely admit, if any one correctly and precisely ascertains what were the causes of the good results obtained empirically, as well as of the great fluctuations in the "sulphur" under this empirical *régime*, and combines these in a clear and definite system, by which the best possible results can be *at all times* obtained, this is a very different affair from anything previously in use.

So far as I know, and as almost universally stated, the best results in sulphur purification were those obtained by Mr. Harris, at the Bow Common Gas-Works. As the official testings show, the average of sulphur at those works was about 22 grains per 100 feet of gas, while the maximum rose to 30, 40, and even 70 grains; and, as shown by his *ipsissima verba*, in the "Supplement to the Gas Referees upon the Sulphur Purification at Beckton," Mr. Harris avowed that the cause of these vast fluctuations was wholly beyond either his knowledge or his control. Indeed, so late as the beginning of 1872, when I was explaining my views as to the primary cause of the utter failure at Beckton to the engineers of the Chartered Company, in the counting-room at Horseferry Road, ascribing it to the inordinate amount of CO_2 which entered the lime purifiers, in consequence of the defective condensation and scrubbing, &c., Mr. Harris himself said, "Well, I used to think myself a great swell in lime purification, but now I find myself left far behind." And, as a matter of fact, the only time I ever saw the gas at Bow Common tested for carbonic acid (during one of the visits of the referees), and when the testing was made at the *outlet of the works*, the lime water employed was immediately turned *milky*, showing the presence of CO_2—a result which could not possibly have occurred if any process of working lime purifiers similar to mine had been in use. Indeed, according to Mr. Harris's own statement, given in writing to the referees, his mode of purification only "removed about 40 per cent. of the sulphur compounds." As Mr. Trewby (in June, 1872) states that the "sulphur" in the crude gas at Bow Common is 40 grains per 100 feet, this, deducting 40 per cent., would leave 24 grains as the average for those works; but, from testings made by the referees in 1870, the correct average for "sulphur" in the crude gas at Bow Common is 34 or 35 grains, which, deducting 40 per cent., leaves 21 grains, which is just a little under the average shown by the official testings. Nevertheless, as the official testings show, after Mr. Harris was informed of my process, for three months consecutively, the sulphur in his gas averaged no more than 5 grains, while the vast fluctuations wholly disappeared, the *maximum* during these three months being only 10½ grains!

I am quite aware that this statement does not exhaust the points to which Mr. Anderson calls my attention, but this is the chief one; and, although I must not trespass further than necessary upon your valuable space, I will be happy to give any further explanations that Mr. Anderson may desire.

Thirdly, as to the letter of Mr. Jones, of Dover. Mr. Jones evidently mistakes the character of my process to which he refers. He states that 15 or 16 years ago, he adopted the use of oxide of iron to purify gas from sulphuretted hydrogen, and that he at the same time used lime to take out the carbonic acid, and that he tested for CO_2 to see that the lime so used was doing its work properly. I need not say that this has no relation to my process of working lime-purifiers, by which these vessels are employed by a particular method, whereby the gas is purified not merely from carbonic acid, but also from sulphur in all forms. In the summer of 1872, when the Chartered Company were prevaricating extensively, my colleague, Mr. Peirce and I put the question direct to a gentleman well known in the gas world, Mr. Paddon, of the Hove works: "Do you know of, or can you name, any gas-works where such a process is or has been in use?" To which he replied, "Well, I must say I do not." In fact every one who really knows the process, knows also that it is a new one, beyond either cavil or question. As regards Mr. Jones's employment of washers, it is simply the ordinary one; whereas by my process the entire purification of the gas is effected by these vessels, the ammonia impurity being made efficacious (while itself being removed) to eliminate from the gas all the other impurities, whether CO_2, SH_2, or CS_2.

Fourthly, Mr. Southby's letter. Mr. Southby's statements, I doubt not, are perfectly correct. The revivification of the fouled soda liquor involves a small loss of lime, if lime be employed to decarbonate it, and also, of course, of labour. This is manifest in the face of the process; and, when I described this process of mine to Mr. George Livesey, he at once noticed this, as one of the items to be taken into account in judging of the economy of the process. But let the facts be taken as Mr. Southby gives them—namely, that in revivifying the fouled soda liquor, there is a loss of 10 per cent. of lime and 5 per cent. of soda. What then? Lime used in gas purification is *wholly* lost, and the sulphur in it also; whereas the sulphur can be obtained in a commercial form from the fouled soda solution, and with a loss of other material only amounting, according to Mr. Southby's statement, to 10 per cent. of the lime and 5 per cent. of the soda. Moreover soda is used in washers or scrubbers, the working of which is more economical than that of purifiers. But, even taking the use of lime and the use of soda as equal in an economical point, there remains this great difference—that the soda process can be freely used in urban gas-works, whereas lime is not only a nuisance, but is forbidden as such. This is a most important advantage, and one which will every year be felt more and more, as sanitary supervision is extended. Indeed, speaking to me of my soda process of gas purification, Mr. Heisch observed, "It might be used in a drawing-room."

In conclusion, permit me to say a word as to your reference to Mr. Livesey's plan, ably described by him at the meeting of the Gas Managers Association in 1866, for desulphuretting gas liquor. Mr. Laming had attained this object by pouring the gas liquor through oxide of iron. Mr. Livesey did so by passing through the gas liquor the smoke from his retort-flues. Surely neither of those processes had anything to do with mine. I have had the pleasure of knowing Mr. George Livesey for nearly six years, and to know him is to esteem him. Immediately upon filing my first patent, I showed to him (as I simultaneously did to Mr. Phillips, of the Chartered Company, and immediately afterwards to Mr. Chubb, of the Imperial Company) a copy of my specification; and in like manner I frankly informed him of my subsequent patent for the new process of purification by ammonia alone. Whatever I had suffered from confiding too much in the Chartered Company (or rather from my former colleague, Mr. Evans), I knew that Mr. George Livesey, like his father before him, was a man as upright and honourable as the day; and, unlike most patentees, I described to him my processes as freely and fully on the day the patent was lodged as I could have done after the patent had passed through the period for objection, and obtained the Great Seal. But never once did Mr. Livesey object, either as to the originality or the propriety of my patents. I think I myself understand gas purification, and certainly few men will question that Mr. Livesey does.

R. H. PATTERSON.

SIR,—In these days of controversy as to who discovered this, that, and the other thing in connexion with gas purifying—although the whole affair is as involved as the question of who was the inventor of sleep—one is glad to see a letter from an old friend respecting such matters.

Mr. Hills first took me in hand in 1853 (see JOURNAL OF GAS LIGHTING, vol. iii., pp. 424 and 456), and as the subject then in dispute leads up to the sayings and doings of the present day, you will excuse my referring to it. Prior to the date just named I had found, by experiment on a large scale, that the affinity of carbonic acid for the hydrate of lime was so much greater than that of sulphuretted hydrogen, that when the CO_2 was introduced into a vessel containing sulphuretted lime, the CO_2 entirely expelled the SH_2 from the lime, taking its place, and converting the lime into a carbonate. Having learned this, I took out a patent in 1853 for ventilating foul lime by the use of carbonic acid, abundance of which could be obtained from the retort-house chimneys; but when the process was in operation, Mr. Hills dropped a little fulminate against me because I was using the oxide of iron to trap the sulphuretted hydrogen which the ventilating medium brought away with it, instead of allowing it to be blown into the atmosphere. Therefore there was no alternative but to use the oxide *in the purifiers* and pay the royalty. Notwithstanding, I was not able to see then, nor have I seen since, how his patent covered the use of the oxide of iron for an effluvium trap.

So far I have only spoken of the desulphuretting of lime; but my experiments were naturally as much in the other direction, in order to see what I had to contend with when I came to the desulphuretting or ventilating process.

The vessels erected for the purpose of carrying out my plans were 24 feet by 18, and would contain eight layers of lime 4 inches deep, making in all, say, 600 bushels of the hydrate in each vessel. Now when from 3 to 4 million feet of gas had passed through at the proper velocity, only the three upper layers were found to require what was called ventilating; the other five were more or less already carbonated; but these three layers were what we now mean by the sulphide of calcium, and would clean a large volume of gas already purified in the ordinary way, from the bisulphide of carbon. This is the gist of one part of my plan called a patent. The other part of my scheme which Mr. Hills especially refers to is to my mind the better method, and has nothing to do with any plan of his. Having found that strong gas liquor removes the bisulphide of carbon from gas already freed from CO_2 and SH_2, I claim consideration for the supplementary scrubber process, as it requires less manipulation and involves less expense than the calcium plan or the gas liquor arrangement patented by Mr. Hills. The resistance to the flow of the gas through the purifying plant is much reduced, and the duration of the scrubbers would extend to many years, as there would be no tar present in the gas to foul them.

WILLIAM MANN.

Gas-Works, Blackfriars, Nov. 12, 1873.

SKOINES'S PATENT GAS.

SIR,—At page 964 of the last number of the JOURNAL I find the following, in explanation of the use of chalk in Mr. Skoines's process:—"*By the time chalk arrives at a red heat it has, of course, lost its carbonic acid.*" I have always been under the impression that carbonate of lime does not part with its carbonic acid simply by being brought to a red heat; that in order to procure caustic lime, the material—limestone or chalk—must be burnt *in contact* with the fuel, so as to convert carbonic acid into the carbonic oxide, which then flies off in the form of gas. Taking that view of the case, I should say that the carbonic acid of the chalk in Mr. Skoines's retort is changed into carbonic oxide by the action of the carbonaceous vapours issuing from the coal, and that that change takes place *in* the chalk retort. The formation of carbonic oxide from the carbonate of lime will account for the increased volume of gas.

Dublin, Nov. 12, 1873. GILBERT SANDERS.

[Carbonic acid is expelled from chalk by heat alone; but the expulsion proceeds much more rapidly in a current of steam, superheated or not.—ED. J. G. L.]

SIR,—Having made many experiments with water gas, my attention has been drawn to a notice, in the last number of the JOURNAL, of a patent taken out by a Mr. Henry Skoines, of London. With your permission, I beg to make a few observations on the mode of manufacturing gas therein described.

Mr. Skoines has, it seems, a stack of seven retorts, in two rows of three each, and a seventh placed above them in connexion with the hydraulic main. By opening or closing a valve between, one-half or the whole stack can be worked at one time; but to understand the process it is sufficient, as Mr. Skoines observes, to take three retorts—first coal, second chalk, and third coke. In the first, or coal retort, gas is produced in the ordinary way, which, with the tar, &c., is carried to the next, or chalk retort, where it becomes mixed with steam. This mixture then passes through the third, or coke retort, into the hydraulic main. In the second, or chalk retort, the difficulties which I am about to point out will be found to begin. It is positively amusing how Mr. Skoines talks about highly heated chalk—as though that body could exist in a highly heated state—for, as you, Mr. Editor, very justly observe, chalk loses its carbonic anhydride at a red heat, and becomes caustic lime. With regard to sulphur, which in coal occurs as persulphide of iron ($Fe S_2$), in the ordinary process of distillation one-half the sulphur is given off, forming sulphuretted hydrogen (SH_2) and bisulphide of carbon (CS_2), the other atoms of sulphur remaining in the coke. Mr. Skoines says that the sulphur is absorbed by the lime, as though the lime were a sponge of unlimited capacity; the fact being that it is absorbed in this way—first sulphide of lime (Ca S) is formed, which, in the presence of steam, becomes oxidized into sulphate of lime ($Ca SO_4$), as shown by the following reactions:—

$$SH_2 + Ca O = Ca S + H_2O$$
$$Ca S + 4H_2O = Ca So_4 + 4H_2$$

Now, if this goes on a short time, it is evident that the lime will become useless, for if coals are used containing 5 per cent. of sulphur (as on analysis I have found some samples to do), the lime will have to be changed to the tune of about 39 tons to every 600 tons of coal carbonized. But Mr. Skoines may say, "If I take out the sulphur at this stage, it will not have to be taken out by the purifiers." Here, however, is a difficulty; the lime remaining clean and free from deposits of carbon, it is evident that a large excess of steam passes over with the gas into the coke-retort over and above the amount required to unite with the carbon that would be deposited by the tar, thereby causing the excess of steam to unite with the carbon of the coke, forming carbonic oxide (CO), carbonic anhydride (CO_2), hydrogen (H), and sulphuretted hydrogen (HS). It is well known that gas made from coke and steam contains on an average 3 per cent. of sulphuretted hydrogen, caused by the other atom of sulphur remaining in the coke being taken up by the hydrogen of the steam, thus returning into the gas as much sulphur as had been previously taken out.

Another point arises here, that when steam is passed over coke, if extreme care be not used, at least 20 per cent. of CO, would be passed over and have to be taken out by the purifiers, thus negativing any idea of saving in purifying material. Mr. Skoines prefers lumps of chalk, in order, as he says, to present more extended surface to the passage of the gas. Now, I have found in my experiments of passing steam over heated lime, that in a very short time it has the effect of disintegrating the lumps of lime down to a powder, and this occurring in a retort will materially reduce the surface exposed to the gas. This would be likely to allow of three-fourths of the sulphur to pass over with the gas. With regard to passing hot gases into tallow, had Mr. Skoines possessed any knowledge of chemistry he would never have thought of passing hot gases into tallow, for by so doing he would produce a body known to chemists as acroleine (C_3H_4O), possessing a most irritable and intolerable odour, and, what is worse, *a liquid*, and not a gas.

I have said nothing about there being some 50 per cent. more apparatus in the shape of retorts, valves, and steam boiler, which must entail a greatly increased expenditure in plant as well as in cost of wear and tear. These items I leave to the consideration of the eminent engineers who have certified as to the quantity and quality of the gas produced by this compound process of Ruck, Basford, and Co.

Nov. 11, 1873. CHEMICUS.

PACKING FOR PUMP PISTONS.

SIR,—Some two years since, I was very much troubled with the packing of a pump piston, the working barrel of which had been made rough from some sand accidentally getting into the well, so that no packing would stand but a very few days, the evil being aggravated from the great pressure in the pump, which was equal to 150 lbs. per square inch.

To get over the difficulty, I had recourse to a combination of leather and yarn, a sample of which I now send. The first application stood eight months, and it has been constantly used since with equal success.

For any greater pressure, the core might be made of india-rubber to any degree of hardness, and covered, as the yarn now is, with a skin of leather.

Should any of your readers be in a similar perplexity, they may find relief from its application.

HY. TEAGUE.

Lincoln Water-Works, Engineer's and Manager's Office, Nov. 13, 1873.

STOPPAGES IN ASCENSION-PIPES.

SIR,—It may not be unacceptable to some of my brother managers to know what I have found to be a cure for the above complaint. I employ a shield of sheet iron, cut to the size of the monthpiece, which is D-shaped, which shield is made to fit as close as it can, so that it may be taken out easily, and allow the gas to pass. I make a straight cut across each corner, about one inch in depth. There is a piece of iron riveted on the back to keep it upright; also a loop to put a rake through to take it out by. When the shield is in place—that is between the retort and the bottom of the ascension-pipe—I have not the least trouble with the pipe stopping; but if it is out, then the pipe will be choked, and I have to clean it out before the charge is half off. I hope some of our friends will try it, and let us have the benefit of their experience.

Lampeter, Nov. 13, 1873. J. SMITH.

LIMERICK CORPORATION GAS-WORKS.

SIR,—In two of the late numbers of the JOURNAL OF GAS LIGHTING you have inserted statements respecting this concern which I feel sure, when you are acquainted with the real facts, you will correct.

In the year 1841 a few influential citizens formed a company in opposition to the United General Company, then supplying the city. The consumers of the United General Company were supplied without meters, and it was computed that the charge then being made for gas was at the rate of 15s. per 1000 cubic feet. The Consumers Company attached meters to all their consumers, and charged 12s. per 1000 feet. The United General Company then reduced the price to 10s. 10d.; the other company reduced also. The United General Company again reduced to 8s. 4d., and afterwards to 6s. 8d., the Consumers Company lowering their price accordingly. It was then found the concern of the Consumers Company was too small for the requirements, and did not pay, so arrangements were entered into to sell the works to the corporation for £10,000, although the United General Company would have paid a much higher price for them. I may here mention that when the United General Company were charging 10s. 10d. here they were charging 12s. 6d. in Cork.

In the year 1856 the transfer took place. The £10,000 corporation bonds given in payment for the Consumers Company's concern was to be subject to 5 per cent. per annum interest, the Corporation Gas Committee to receive out of the rates any sum required for extensions of plant, &c., and in the course of eleven years they received for the purpose £7331, about 2½d. in the pound for that period on the rates of the city. The corporation, on the transfer, reduced the price of gas to 5s. 6d., and afterwards to 5s. per 1000 feet, the present price charged by both concerns, the Gas Committee always paying the 5 per cent. interest on the original £10,000 Corporate Bonds. A loss occurred in eight years working, from 1856 to 1864, of £3000, but knowing the boon conferred on the citizens, the committee would not raise the price of gas. The surplus profit, after paying interst to bondholders, over draft to bank, &c., also allowing 10 per cent. for meter depreciation, and about 3 per cent. for plant, has reduced the £3000 lost up to 1864, in the past eight years, to £945. Last year, owing to the increased price paid for coal of £1400 over former years, the profit and loss fund had only to be debited with £479 to meet the sum required to pay the interest to bondholders, &c.

The Corporation Gas Committee have expended £6704 during the past seven years in erecting additional apparatus, mains, meters, &c., without asking the ratepayers to contribute one penny, and the revenue has increased in the same period £1000 per annum. The original works erected in 1841 could only make 12,000,000 feet per annum, and last year the make reached 33,500,000 feet.

The actual liabilities of the concern are £33,000, but out of this sum we have assets amounting to £7643.

The real object in disposing of this concern and forming one company for supplying the city is to save the great leakage, cost of management, and to obviate the great difficulty found in collecting the accounts when two companies exist.

Plant expenditure to Dec. 31, 1873	£20,720	6	0
Meter " " "	3,314	14	9
	£24,035	0	9
Gas-rental to Dec. 31, 1873	£6,608	11	10
Coke, tar, and residuals to Dec. 31, 1873 . . .	1,926	9	3
	£8,535	1	1

Limerick, Nov. 10, 1873. WM. L. OTTY, Manager.

Review.

The Gas Consumers Manual. By E. S. Cathels, C.E.
On the Setting and Working of Retorts. By E. S. Cathels, C.E. Revised by the Author.—Montreal: E. S. Cathels. London: W. B. King. 1873.

Mr. E. S. Cathels, formerly the engineer to the Crystal Palace District Gas Company, most of our readers will remember, has crossed the Atlantic, and settled in Montreal. There he has republished "The Gas Consumers Manual," and also a paper "On the Setting of Retorts," read by him at the meeting of the Gas Managers Association in 1870, in each case supplementing the original work with such new matter as was necessary to keep abreast of the times. "The Gas Consumers Manual" was noticed in our columns at the time of its original publication in this country, and we can now only repeat the favourable opinion then expressed. It is a book which may be strongly recommended to the consumer, and also to inspectors and gas-fitters, who have often to instruct the public in the use of gas. The paper on the setting and working of retorts is, of course, addressed to managers, who will find therein useful hints from an experienced hand.

Legal Intelligence.

CLERKENWELL COUNTY COURT.—Tuesday, Nov. 11.

(*Before* G. Whitbread, *Esq.*, *Judge.*)

NEW RIVER COMPANY *v.* WILLIAMS.

Mr. Popham, a solicitor, appeared for the plaintiffs, and stated that this was an action to recover the sum of £5. The defendant was a newsvendor, living at 192, Seymour Street, Euston Square, and he had committed what the plaintiffs called a felony, inasmuch as instead of having water on the premises, he obtained it from an adjoining house, which was prohibited by the company's Act of Parliament. The defendant had been summoned before Mr. Barker, the magistrate at Clerkenwell Police Court, for the amount due, and at his solicitation the summons was withdrawn on his undertaking to pay £5, which was £2 11s. for arrears of water-rate; £1 2s. for re-affixing the supply-pipe, and £1 7s. the agreed costs. Defendant signed the following document on Oct. 17, 1872:—

I hereby agree, in consideration of your withdrawing, with the consent of the magistrate of the Clerkenwell Police Court, from the prosecution of me for illegally taking water, to pay you, or one of your collectors on your behalf, within one month from this day, the sum of £5, being £2 11s. for arrears of water-rate, £1 2s. for re-affixing supply-pipe, and £1 7s. cost of summons against me, and regret that any conduct of mine should have compelled you to take proceedings against me.—J. P. Williams.

This document was handed to defendant before Mr. Cheere, the Registrar, and defendant admitted having signed it, but alleged that because he had paid the water-rate subsequently he was not liable. Mr. Cheere occupied some time in endeavouring to instil into the defendant's mind that that was no defence, yet he still persisted in having the case tried before his honour.

Mr. *A. H. Debenham*, of the firm of Debenham and Son, solicitors to the plaintiffs, was called to prove the circumstances under which the document produced was drawn up and signed.

The Judge said he could not see what defence the defendant had if he had not paid the money.

Defendant said he had not been asked for the money before he received the summons, and as the document was drawn up and signed 13 months ago, he did not think he ought to be called upon to pay the money now.

The Judge said defendant must pay the amount, and had better have done so when he received the summons, or have admitted it before the Registrar, which would have saved him some costs.

Defendant said he was not in a position to pay it. The Sunday trading prosecutions made a difference in his income.

Mr. Popham said the Act did not apply to Sunday newspapers, as they were not in existence when the Act was passed.

The Judge said the defendant must pay the money. He had no doubt been robbing the company by having the water cut off at his own house, and obtaining it elsewere without payment, but as he (Mr. Whitbread) did not sit there as a criminal judge, he could only deal with the defendant for the amount due, and he should give judgment in favour of plaintiffs for the whole amount, to be paid at £1 per month, and should award full costs.

HAMMERSMITH POLICE COURT.—Wednesday, Nov. 12.

(*Before Mr.* Bridge.)

THE GASLIGHT AND COKE COMPANY *v.* O'BRIEN.

Major *O'Brien*, the defendant, residing in Royal Crescent, Notting Hill, appeared by his solicitor, Mr. Crump, on a summons taken out by The Gaslight and Coke Company, for non-payment of £5 5s. 3d., being the amount due for gas supplied to him by the plaintiffs in Lansdown Road, and for other charges.

Mr. *Frank Wood*, a clerk in the plaintiffs office, said that on the 28th of January last a letter was sent to the Board of Trade asking for the appointment of commissioners, under the City of London Gas Act, 1868, to revise the price of gas and its illuminating power in consequence of the high price of coals, iron, and labour. On the 10th of February a letter was received from the Board of Trade announcing the appointment of three gentlemen as commissioners. These gentlemen met on the 27th of March, and continued their sittings at intervals until the 24th of April, during which period they heard evidence for and against the proposed change, and on the 25th of April they made an award, by which they fixed the price for cannel gas (of 23 candles illuminating power) at 6s. 3d. per 1000 cubic feet, "to take effect as and from the 1st of January, 1873." The company thereupon issued notices to their consumers with the award printed on the back of them.

Mr. Crump said the award was given after the defendant's gas was cut off, and after Major O'Brien had ceased to consume it.

Mr. Wood said by the award of the commissioners the increase was to date from the 1st of January.

Mr. Bridge said the company clearly had power to charge 6s. 3d. after the 1st of January.

Mr. Crump called attention to the meter index card for the Christmas quarter left with Major O'Brien, which he said was the only contract between him and the company. The card specified that the gas was to be supplied at the rate of 5s. 5d. per 1000. He argued that it would be absurd on the face of the card to say that the defendant could be governed by the award.

Mr. Wood said: On the 16th of December a notice was issued to the consumers announcing that from the 1st of January the illuminating power of cannel gas would be increased to 23 candles, at 5s. 5d. per 1000, or at such prices as might be approved by the Board of Trade.

Mr. Crump said a general notice, unless brought under the attention of the consumers, would not be binding.

Major *O'Brien* said he never received it.

Mr. Bridge thought the notice was good, but inasmuch as the index card was delivered afterwards, the company were bound by it until an express notice was given of an alteration. The consumers ought to have notice of the increase of price, and the liberty of refusing to have the gas. As the company were not represented by counsel, he would adjourn the summons for a week; but if they wished to have the question argued again, notice must be given.

Mr. Crump asked for costs, but the magistrate said it was not a case to grant any.

LIVERPOOL POLICE COURT.—Tuesday, Nov. 4.

(*Before Mr.* Raffles.)

The *Liverpool United Gas Company* were again summoned by James Griffith, of Richmond Row, for that they did, on the 15th ult., after a deposit of a reasonable sum, and after application had been duly made, neglect to supply gas required for the complainant's premises, contrary to the statute.

Mr. W. Pierce appeared for the complainant; and Mr. Myebergh, barrister, and Mr. Garnett (solicitor to the gas company) for the defendants.

Mr. Pierce referred to the former hearing of the case before other magistrates on the 21st ult., and stated that the information was taken out under the Act 11 & 12 Vict., cap. 38, sec. 49, which read as follows:—"And be it enacted that upon the application of the owner or occupier of any building or premises within the limits of this Act, the company shall supply gas as may be required to such building or premises, and that although there may be rent in arrear for gas supplied to a former tenant of such building or premises; and if for the space of ten days after such application and a deposit of a reasonable sum as hereinafter mentioned, if required, the company shall neglect to supply gas as required, they forfeit and pay a sum of £5, and the like sum for every day during which such neglect shall continue." The section of the Act was evidently meant to apply to houses recently completed. The complainant had been a consumer of gas for 15 or 16 years, and had always paid a reasonable deposit. He had also paid his gas bill every quarter as soon as the demand had been made upon him. On the 7th of October the complainant was notified that he must increase his deposit by £5, or else his gas supply would be cut off. He refused to pay the extra deposit, and in consequence the gas was cut off. Gas was in these days almost a necessary of life, and the loss of gaslight was a great harm to business, as in this case. The gas was restored the next day. The proceeding of the company was most arbitrary and exceptional. When the summons was heard previously the magistrates were in favour of the defendant, but the magistrates clerk, said that the gas must be cut off for ten days for a penalty to be incurred. If that was the case, gas might be turned off for nine days and then be turned on for a day, and so on for years.

Mr. Raffles said the section evidently referred to newly-tenanted premises, and not new buildings, as the words "any former tenant" showed.

The complainant was called, and said he was the owner of the premises in question, which were of £4000 value. He had consumed gas from the defendants for 12 or 15 years, and had paid deposits on an average from £5 to £15. On the 7th of October he paid his last quarter's bill, and received a form, which stated that he must pay £5 deposit in addition to what he was paying. He was told that unless he paid it his gas would be cut off, and he said he would not pay it. On the 15th the gas was cut off.

Cross-examined by Mr. Myebergh: About nine or ten years ago witness was bankrupt. He had a deposit of £5, and his account with the gas company might have been £8 8s. 2d., on the balance of which they would get a dividend.

Mr. Myebergh said that the gas company had no wish to show the complainant any harsh or exceptional treatment. They were bound to protect their shareholders and the public, who received the benefit after the shareholders had received a certain per centage. They could only judge of a man by his antecedents—by the way in which he paid his bills, and the plaintiff had no reason to complain. The section under which the summons was laid applied to persons taking premises for the first time, who made application to the gas company for gas.

Mr. Raffles asked what other clauses there were in the Act relating to the company's power in cutting off gas?

Mr. Myebergh said there was nothing in the Act. If once the gas was laid on there was a practical contract between the company and the consumer that the consumer should continue to have gas. If the company cut off the gas there would be a breach of contract, in which the consumer would have his ordinary remedy at law.

Mr. Raffles said it was a matter of contract. If the defendants cut off gas the person aggrieved could bring his action. He therefore dismissed the summons, and refused a case, which was applied for by Mr. Pierce.

DUDLEY POLICE COURT.—Friday, Oct. 31.

(*Before Mr.* Tilley.)

THE CORPORATION OF DUDLEY *v.* THE SOUTH STAFFORDSHIRE WATER-WORKS COMPANY.

Mr. Underhill (instructed by the town-clerk) called the attention of the bench to this adjourned case, which was a summons for a non-supply of water to the town. He said the summons was dated as far back as the 11th of February, and related to a short supply of water to the town during three days in that month. On the first heiarng, it was stated that there was no desire to prosecute the company, only that an arrangement should be made whereby the town should have a good supply of water in the future. More than one adjournment had taken place—first, to enable the company to provide extra pumping power; and secondly, because reports of an independent engineer were required. In the time of the adjournments there was a better supply of water, so that the town was really benefited. Six months had elapsed since the first proceedings were taken, and during that time the company had done all in their power to remedy the evil which had been complained of. This was a proof that they intended to go on and keep up a good supply. Under those circumstances, he had advised the council to withdraw the charge, on condition that the company paid the whole of the costs, subject to the taxation of Mr. Barradale, the magistrates clerk. This the company had agreed to, and had promised to take measures to keep up the supply. In withdrawing from the case, he wished the public to know that his remarks did not affect the future, and any one with a clear case of non-supply might proceed against the company.

Mr. Young, on behalf of the company, said that they had done all in their power, and had given a good supply. Ere long they would have the most perfect and complete machinery, so that in the future there would be a good and permanent supply. On behalf of the company, he agreed with what Mr. Underhill had said.

Mr. Tilley, the presiding magistrate, said there was no desire on the part of the bench to inflict a fine on the company, and they were very glad to find that the town was likely to have a good supply of water.

The summonses were then withdrawn.

Brighton Public Lamps.—The Brighton and Hove Gas Company, in rendering their account to the corporation for the supply to the public lights, £575 1s. 4d., have charged that body the increased price of gas—viz., 4s. per 1000 cubic feet—from the date of the passing of their Act, the 7th of July last. The Town Council being so advised, refuse to pay this increased price except from the 22nd of August, and have returned the account amended, the difference amounting to £24. Applying the same principle to the charges for the supply of gas to the market and other places belonging to the corporation, they have amended those accounts accordingly. The company demur, and have informed the council that though the amount in question is inconsiderable, yet, having regard to the important interests which would be compromised by their concurrence in the advice given to the Town Council, they most respectfully, but most firmly, decline to accede to the terms of such advice, or to accept the amended account. At the last meeting of the Corporation Gas Committee, it was resolved that the Finance Committee be requested to recommend to the council to tender to the company the amount of their bill as taxed by the corporation officers.

Miscellaneous News.

GAS AND WATER WORKS FACILITIES ACT, 1870, AMENDMENT ACT, 1873.

Board of Trade Inquiry at Wrexham.

Report of Mr. A. G. Vernon Harcourt to the Board of Trade.

Mr. A. G. Vernon Harcourt, the commissioner from the Board of Trade, who recently held an inquiry in Wrexham as to the application of the gas company for a Provisional Order to enable them to increase the price of gas 1s. per 1000 cubic feet, has made the subjoined report to the Board of Trade:—

Oxford, Oct. 27, 1873.

Sir,—I have the honour to report, for the information of the Board of Trade, that I held an inquiry at Wrexham, on the 15th and 16th inst., with reference to the application of the Wrexham Gaslight Company for a Provisional Order under the Gas and Water Works Facilities Act, 1870, Amendment Act, 1873.

The proposed amendment related only to the maximum price of the gas to be supplied. No objections were urged against the provisions of the existing Act (the Wrexham Gas Act, 1870) in respect of the illuminating power of the gas to be supplied, or the pressure at which the gas is to be supplied.

A petition against the proposed Provisional Order from ratepayers and gas consumers had been transmitted to the Board of Trade, representing that "any variation in the increase of the price as proposed under a Provisional Order would be a deception and breach of contract solemnly entered into with the town under the pressure of opposition, and as the basis on which their bill was in a committee of the House of Commons granted." This objection applies not so much to the application of the Wrexham Gas Company as to the policy of the Act under which the application is made. It was abandoned at the outset of the inquiry.

A memorial from the Wrexham Town Council had also been sent in to the Board of Trade objecting to the proposed increase in the maximum price of gas, and especially to the increase in the price of gas proposed to be charged to all persons who may burn gas by meter within a radius of one mile from the centre of the town, on the following grounds:—

1. That the cause of the diminution in the company's dividends is an undue increase of their capital.

2. That such increase has been in connexion with the operations of the company outside the borough of Wrexham, and was not necessary for the requirements of the town of Wrexham.

3. That good gas coal can now be purchased in Wrexham for 18s. per ton, which is the lowest rate at which many gas-works in England have been able to purchase their coal prior to the advance in the price of coal in 1871.

4. That in the town of Wrexham there is an excellent market for the disposal of residual products, and that during the past year the company received £400 more from that source than in any previous year.

5. That the works of the company in 1870 were sufficient for the supply of gas for the town of Wrexham.

6. That if power to increase the rate is given, the company will further increase their capital, and will then again seek power for a further increase in the rate for gas.

The arguments urged on either side during the inquiry, and the evidence adduced in support of them, may conveniently be considered under the above heads:—

1. It appears from the printed accounts of the company, that on

June 30, 1870—	The share capital was	£12,000
" " —	The amount of loans	3,000
" 1871—	The share capital was	19,800
" " —	The amount of loans	6,000
" 1872—	The share capital was	27,000
" " —	The amount of loans	6,250
" 1873—	The share capital was	27,500
" " —	The amount of loans	7,500

showing an increase in three years on called-up capital and loans of 133 per cent. During this period the increase in gas-rental has amounted to only 30 per cent. The reason of this disproportionate increase of capital will be considered under 2 and 5.

2. The plea most strongly urged in the memorial of the Wrexham Town Council is that the company had raised additional capital in order to "try the experiment of providing a supply of gas for outlying straggling districts." The result of the inquiry was greatly to weaken this plea. It appeared that out of £17,764 expended on works and plant, mains and services, since June 30, 1870, the amount expended on mains and services is £3406; that about £1000 out of the £3406 was expended withiu the one mile radius from Wrexham Church, leaving about £2400 as the capital expended on the distribution of gas to consumers residing more than one mile from Wrexham Church. It is also clear from the preamble of the Wrexham Gas Act, 1870, and from the 4th and 6th sections of that Act, that the company were empowered to increase their capital in order "that the works, mains, and pipes of the company should be enlarged and extended" for the purpose of extending the supply of gas, not only in the borough of Wrexham, but throughout the limits of the Act. Much evidence was given as to the circumstances and policy of the three extensions beyond the one mile circle which the company has made. It was not proved, in my opinion, that the company has acted unwisely in this respect.

3. The manager of the gas-works has stated that he is receiving coal under a contract extending to March 31, 1874, at a total cost at the works of 20s. 1d., and that the then price of cannel coal was 26s. 9d. at the works. It was not contended that the company had acted improvidently in regard to its purchases of coal. The advantage which the Wrexham Gas Company has in the nearness of a supply of coal, as compared, for example, with gas companies in London, is partly counterbalanced by the inferiority of the coal. The average volume of gas sold per ton of coal is, in London, 8100 cubic feet, in Wrexham rather less than 7000 cubic feet, and this deficiency does not appear to be due to "unaccounted-for gas," nor to any defect in the process of manufacture, but to the quality of the coal employed.

4. The increased receipts for the residual products at Wrexham, as elsewhere, serve to some extent as a set-off against the increased price of coal.

5. The main point urged against the company by the counsel who appeared for the corporation of Wrexham was, that the abandonment of the old works of the company in 1870, and the erection of new works on a different site, was unnecessary, and caused an undue increase in the capital of the company. From the evidence given at the inquiry, there seems no doubt that the old works were capable of supplying a sufficient quantity of gas, not only to meet the present demand, but also to provide for the probable extensions during several years to come. On the other hand, Mr. Hawksley, who was consulted by the company, and visited the works in 1869, gave evidence as to the condition of the old works, which goes to prove that very strong reasons existed for the step taken by the gas company. He states: "I found the old works totally unfit for the purposes of a gas-works for the supply of even one quarter of the gas made. You may judge of the magnitude of the works when I tell you that, including the gas-yard and everything else, it was only about 40 yards one way and 50 yards the other. I never saw such crowded-up works."

He states also that on the old site the company were obliged to resort to a great many expedients for making storeage for tar and ammoniacal liquor, and a large quantity escaped into the ground, and created a nuisance. This latter statement is borne out by the evidence given before the select committee on the Wrexham Gas Bill in March, 1870, which was put in as evidence in this case. Several witnesses who gave evidence against the bill desired that the works should be removed to another site; and, although their desire was that the new site should be at a distance from the town, I am of opinion, from the evidence given before me, and from visiting the works, that the present site—which, though little removed from the old site, is actually on the verge of the town—is perfectly suitable for gas manufacture, that the nuisance complained of has ceased, and that the erection of works at a greater distance from the town would have increased the cost of manufacture. Moreover, Parliament has sanctioned the use of the present site, after a full inquiry; and the augmentation of the capital, which the company is empowered to raise from £12,000 to £50,000, as well as the statements in the preamble of the Wrexham Gas Act, proves that a large extension of the company's works was in contemplation at that time. The abandonment of the old works, which, to judge from the evidence given before the parliamentary committee, had not then been resolved upon, was urged upon the company by Mr. Hawksley, and the directors of the company are entitled to the protection of having acted under the best professional advice.

The immediate occasion of the transference of the works was a fire, which destroyed the offices and other property of the company to the value of £500 or £600. It was suggested that it was this comparatively small loss which led the directors into an outlay of £12,000. It was also pointed out that a company which believes itself able to pay its maximum dividend on an increased capital is under an inducement to find a reason for creating additional capital.

After reviewing all the evidence given before the select committee on the Wrexham Gas Bill in 1870, as well as that to which I have recently listened, I am of opinion that the abandonment of the old works, and the erection of new works on the present site, was a fair and wise step for the company to take. It was an immediate benefit to the town of Wrexham, and should ultimately prove advantageous to the company also. They are fortunate in having provided themselves with new works and mains just before the recent extraordinary rise in the price of iron.

6. I do not share the apprehension that if the application for a Provisional Order is granted this will induce the company to increase their capital, and in consequence to seek a further increase in the price chargeable for gas. Any relief granted to the company should be such only as will save them from undue loss, owing to the increased cost of production of gas. It should not affect a diminution of dividends resulting from an increase of capital, whether such increase were made judiciously or otherwise. I think that as far as possible the company should be left in the same financial position which they would have occupied if no unusual rise of prices had occurred since the passing of their special Act.

I have now reviewed the principal objections urged against the application of the company for a Provisional Order. It has been proved that the company suffered a great loss during the last financial year, owing to the increased price of coals, and must suffer a greater loss during the current year, if they are still limited to the present maximum charge for gas. It has not been proved, in my opinion, that the company have been guilty of such mismanagement of their concerns as might be held to disentitle them to the relief sought for.

I beg leave, therefore, to recommend that the Board of Trade should make a Provisional Order amending the Wrexham Gas Act, 1870, in relation to the maximum price of the gas to be supplied.

The Gas and Water Works Facilities Act, 1870, Amendment Act, 1873, does not specify by what principles the revision of the maximum price of gas is to be guided.

The addition to be made to the maximum price of gas prescribed by the special Act must depend upon whether it is proposed to place the company as nearly as possible in the position which they would have occupied if the unusual increase in the cost of the production of gas had not occurred, or to enable the company to pay a dividend at the maximum rate now to be prescribed in accordance with the 7th section of the Act.

I shall not, therefore, venture to recommend what sum should be fixed as the maximum price of gas in the Provisional Order, but I shall attempt to show to what extent the Wrexham Gas Company has suffered by the recent rise in prices, and what would be the effect upon the net revenue of the company during the year ending June 30, 1874, of any given increase in the price of gas.

The numbers in the following table, excepting those in the last column, are derived from the annual reports of the directors of the company:—

Summary of Revenue Account, for the Financial Year ending June 30.

	1870—1871	1871—1872	1872—1873	1873—1874 (Estimate).
Coal and cannel	£1459 12 7	£1554 4 8	£2860 19 8	£3605 0 0
Workmen's wages	458 12 5	522 3 10	563 12 3	688 0 0
Repairs and renewals of works, mains, and meters	243 19 3	349 17 7	252 4 3	277 0 0
Working expenses and purification	182 13 6	168 6 1	155 12 6	171 0 0
Salaries and directors allowance	455 17 8	357 19 7	273 18 5	301 0 0
Rents, rates, taxes; legal, and other expenses	250 10 10	252 11 6	234 15 8	258 0 0
Gross cost of manufacture	£3051 6 3	£3205 3 3	£4346 2 9	£5300 0 0
Gas supplied	£3570 11 7	£3800 1 2	£4197 15 11	£4618 0 0
Residual products	403 5 8	506 0 11	909 4 1	1096 0 0
Meter-rents, &c.	288 6 1	302 14 3	386 16 7	426 0 0
Gross revenue	£4262 3 4	£4688 16 4	£5493 16 7	£6140 0 0
	3051 6 3	3205 3 3	4346 2 9	5300 0 0
Net revenue	£1210 17 1	£1463 13 1	£1147 13 10	£840 0 0
Interest paid on loans during the year	166 4 6	265 6 7	307 18 8	338 0 0
Dividend earned in the year	£1044 12 7	£1198 6 6	£839 15 2	£502 0 0

The numbers in the last column represent the estimated items of expenditure and income for the current financial year. They have been obtained as follows:—

The increase in the sale of gas from June, 1870, to June, 1872, was at the rate of 8 per cent. per annum.

During the past year it increased by 10 per cent., and, considering the evidence produced on the part of the company as to the demand to be anticipated in the neighbourhood of Wrexham, I think it fair to presume that in spite of a rise of price the latter rate of increase will be maintained for the next year or two.

To supply this quantity of gas the company will need to purchase according to last year's rate of manufacture 3430 tons of coal and 120 tons of cannel,* costing, at the present price of 20s. 1d. for coal and 26s. 9d. for cannel, £3604 16s. In other items I have assumed that an increase is likely to take place proportional to the increase in the make of gas, but in the case of "Workmen's wages," I have allowed for a further increase of 10 per cent.; and in estimating the

* According to the evidence given by Mr. Hawksley and others, this proportion of cannel is insufficient to yield the prescribed illuminating power. In 1870-71 the company used 10 per cent. of cannel, in 1871-72, 6 per cent., and in 1872-73, 3·2 per cent. But the consumers are guarded by sections 66 and 67 of the Wrexham Gas Act, and I cannot assume that the company have been using latterly too little cannel, and will in future years use a larger proportion.

receipts by the sale of "residual products," I have taken 18s. and not 15s. 10½d. as the probable value of a ton of coke. I think it unlikely that coke will sink to the average of last year, or much below its present rate, while the price of coal keeps up. £4618 is the sum which would be brought in by the sale of the estimated quantity of gas—viz., 23·39 million cubic feet, at the present price.

According to the above estimate, if the present maximum price of gas were maintained, the greatest dividend the company could pay on their present capital would be at the rate of 1½ per cent. per annum.

The addition of one penny to the price of gas yields upon the estimated make of gas £97 9s.

To pay a dividend upon the present capital of £27,500, at the rate proposed in the draft Provisional Order of £4 12s. 6d. per cent., £1271 17s. is required; for a dividend at the rate of 5 per cent., £1375.

A charge of 4s. 8d. per 1000 cubic feet of gas would yield a dividend of £1282. A charge of 4s. 9d. per 1000 cubic feet of gas would yield a dividend of £1379.

But these dividends would represent the whole balance of the revenue account, after paying interest on loans, leaving nothing for a reserve-fund, such as the company is entitled to form under sections 30-34 of the Gas-Works Clauses Act, 1847.

The extent to which the company has suffered by the increased cost of production of gas may be seen from the following comparison:—The mean cost of coal required per 1000 cubic feet of gas sold, in the two years ending June 30, 1872, was 19·41d.; the mean receipt by the sale of residuals was 5·84d., giving for the net cost of coal, 13·57d.

For the year ending June 30, 1874, the estimated cost of coal per 1000 cubic feet of gas sold is 37d.; the estimated receipt by the sale of residuals is 11·25d., making the net cost of coal 25·75d.

To compensate for this rise in the price of coal it would be necessary to add 12·18d. to the price of gas, and not less than another 1d. to compensate for the increased cost of other materials, such as the iron used for the repair and renewal of mains, and the rise of wages.

If the object aimed at in the revision of the maximum price of gas is, subject to the limitation made by the 7th section of the Act, to place the company in the financial position which was assigned to them by their special Act, I believe that the addition of 1s. to the maximum prices of gas (at different distances) fixed by the special Act, as proposed in the draft Provisional Order, is rather too little than too much to effect that object.

In the replies made to the Board of Trade by the Wrexham Gas Company, and in the draft Provisional Order, "the amount of dividend paid during each of the two financial years next preceding the application" is taken to include the four half-yearly dividends, paid in March, 1872, at the rate of 3 per cent.; in September, 1872, at the rate of 3 per cent.; in March, 1873, at the rate of 2 per cent.; and that which was declared on Aug. 20, 1873, at the rate of 1½ per cent. These give for the average rate of dividend £4 12s. 6d. per cent. per annum.

During the inquiry Mr. Hawksley stated that he considered that this mode of calculation was not that intended by the Act, and suggested another, which differs from it in two respects. He considered that the average to be taken was not of the rate per cent. of the several dividends, but of the actual sums divided in the two years, the result differing in the two cases, since the capital of the company has increased during that period. Also, he understood, by "the financial year," the year ending on June 30, which is the period of time dealt with in the annual reports and statement of accounts made to the company by their directors. The small dividend declared on the 20th of August last is not included on this interpretation in the "two financial years next preceding the application," which run from June 30, 1871, to June 30, 1873.

It will be seen that "the average amount of the dividend" may have four different values assigned to it, according as one or other mode of reckoning in each of these two cases is deemed correct. If Mr. Hawksley's view be correct on both points, the Wrexham Gas Company is entitled to a dividend at the rate of 5 per cent.

Dividend made in the year ending June 30, 1872 . . .	£1541	6	4
Ditto ditto June 30, 1873 . . .	1306	6	2
	2) 2847	12	6
Average for the two financial years	£1423	16	3

A less sum, £1375, will pay a dividend at the rate of 5 per cent. on the present capital of the company.

I submit this question also to the decision of the Board of Trade.

It was contended, on the part of the Wrexham Town Council, with reference to the same section of the Act, that the dividend to be considered, in determining the maximum rate of dividend to be prescribed by the Provisional Order, is not that actually made by the company, which may be formed in any degree out of a reserve from former years, and thus may not represent the condition of the company during the two financial years in question, but the dividend earned during the two years.

Suppose the case of two companies, each having a considerable balance to the credit of net revenue in the autumn of 1871, and earning during the two following years a sum insufficient for a dividend of more than 3 or 4 per cent. One of the two keeps the balance of 1871 in reserve, and divides only the earning of each year. The other expends the balance in increasing its dividends.

Apparently the former, in view of an increase in the cost of manufacture, has followed the more prudent course, but the latter, by a calculation of the average amount of dividend paid in the two years, will be entitled under a Provisional Order to the larger dividend in future.

The Wrexham Gaslight Company is in this latter case. The dividend paid, not in but, out of the earnings of the financial year ending June 30, 1872, and out of the balance in hand, was at the rate of £6 per cent. per annum. The maximum dividend payable out of earnings in that year would have been at the rate of £4 8s. 9d. per cent. per annum.

The rate of dividend paid out of the earnings of the year ending June 30, 1873, and out of the balance in hand was £3 5s. per cent. per annum. The rate of dividend earned was £3 1s. 2d. per cent. per annum.

The average rate of dividend paid from earnings of the two years and former surplus is £4 12s. 6d. The average rate of the dividend earned in the two years is £3 15s.

It seems to me, although I have thought it right to bring this objection to the maximum rate of dividend proposed in the draft Provisional Order under the notice of the Board of Trade, that it touches the policy rather than the interpretation of the 7th section of the Act.

With this report I submit to the Board of Trade a statement furnished me by the secretary of the company as to the amount and price of the coal used since March, 1870; also some calculations as to the company's manufacture and financial position, which I have received from Mr. Hawksley and Mr. Stevenson; also the directors reports and statements of accounts for the years 1870, 1871, 1872, and 1873; also an account of the proceedings at the inquiry, cut from the Wrexham paper of the 18th inst.

The copy of the shorthand-writer's notes, which is a most exact transcript of all that was said during the two days occupied by the inquiry, I have returned to Messrs. Wyatt, Hoskins, and Hooker, of 28, Parliament Street, Westminster, at their request. (Signed) A. G. VERNON HARCOURT.

The Secretary, Railway Department, Board of Trade.

The following Provisional Order has been applied for by the

BURNLEY CORPORATION.

A Provisional Order for Amending section 170 of the Burnley Borough Improvement Act, 1871.

"Whereas, under and by virtue of the provisions of the Burnley Borough Improvement Act, 1871, the Corporation of Burnley, as defined by that Act, are enabled to supply gas for public and private purposes, and by the 170th section of that Act it is enacted that the highest gas-rent payable to the corporation for gas supplied by them within the borough shall be at the rate of 3s. per 1000 cubic feet. And whereas the Corporation of Burnley, acting in execution of the Burnley Borough Improvement Act, 1871, are desirous that the said 170th section of that Act should be amended in the manner hereinafter provided, and have for that purpose made application to the Board of Trade for the grant of a Provisional Order authorizing such amendment. And whereas the said Board of Trade have considered the application so made to them, and are satisfied that it is proper and expedient that a Provisional Order should be made authorizing such amendment.

"Now therefore the Board of Trade do hereby, pursuant to and in exercise of the powers and authorities in that behalf conferred upon them by the Gas and Water Works Facilities Act, 1870, Amendment Act, 1873, make this Provisional Order, and it is hereby ordered:

"1. That from and after the day of 18 the 170th section of the Burnley Borough Improvement Act, 1871, shall be amended by striking out the word 'three' in such section, and by inserting in lieu thereof the word 'four,' to the intent that from and after the date aforesaid the 170th section of the Burnley Borough Improvement Act, 1871, shall read and be as follows:—'The highest gas-rent payable to the corporation for gas supplied by them within the borough shall be at the rate of 4s. per 1000 cubic feet.'

"2. That the operation of this order shall be limited to the period of two years from the day of 18 ."

DEATH OF MR. WILLIAM INNES.—This gentleman, who for 25 years had been in the service of the Phœnix Gas Company, died on the 1st inst., at Mays, Warnham, Sussex. He retired a few years ago from the office of chief engineer of that company.

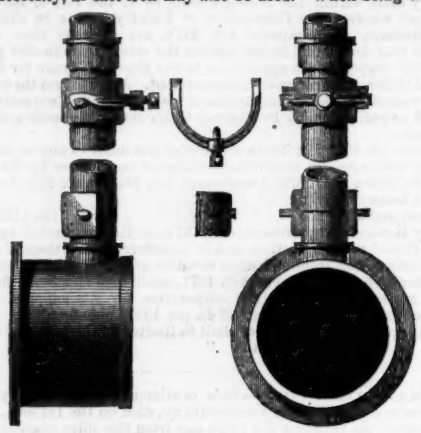
WHITLEY PARTNERS, LIMITED.—The business of mechanical engineers founders, &c., carried on for nearly 30 years at the Railway Works, Leeds, by Messrs. Whitley Partners, has just been transferred to a joint-stock company, limited, under the above title. The capital of the new company is £150,000, in 15,000 shares of £10 each, one half of which are offered by prospectus only amongst the friends, customers, &c., of the old firm privately. The conversion of this firm into a public company has arisen from the intended retirement of the senior partner, and the requirements of a larger capital in consequence of the development of the business. The purchase-money for the whole concern is £100,000, payable as to one moiety in fully paid-up deferred shares, and as to the other moiety in cash by four instalments extending over 12 months. The old firm recently obtained at the Vienna Exhibition the "medal for merit" for their class of exhibits, for "excellence in material and workmanship, the employment of improved tools and machinery, and the opening of new markets."

PETROLEUM GAS.—The Pittsburgh *Commercial* states that the method discovered by Mr. Charles Gearing, of that city, has been put into successful practical operation at Sharpsburg, Pa., and the borough is now admirably lighted by gas made from crude petroleum oil, 8000 feet of gas being produced from one barrel of the oil. As the subject is one of great importance, not only to the inhabitants of our towns and cities, who need good light at a cheap price, but also to gas companies and oil producers, we will give a few details of the Gearing process, from which practical gasmen may, in some degree, judge of its actual merits. To us it looks like a good improvement, worthy of the careful investigation of all who are interested in the extensive branch of industry to which it pertains. In the simpler form of the Gearing apparatus, some seven retorts are employed in connexion with one furnace. These retorts have double chambers, made by enclosing small cylinders within other cylinders of large diameter. The inner cylinders are filled with pebbles, the object of which is to provide very extensive heating surfaces. A jet of steam and air is, by means of an injector, introduced at one end of the first of the series of retorts, and then passes through the pebbles, successively into and through three other retorts, until the steam and air are thoroughly dried and heated; thence the jet goes into contact with the crude petroleum in another retort, and takes up therefrom a supply of the oil vapour, thence on successively through three other retorts contained in the furnace, where the final heating takes place, thence into the gasholder. The operation is simple and continuous. The peculiar construction of the retorts is alleged to prevent loss of oil by conversion and deposit into solid carbon, the only resulting deposits in the retorts being the sand usually found in crude oil, with some other foreign matters. A company has been formed, we understand, to put this process in operation in Titusville, Pa. We shall look with much interest for the practical results. The success of this or any other method of employing crude oil for permanent gas illumination would create an immense demand for the article, and give relief from the depressing effects of over production under which the oil market now suffers.—*Scientific American.*

BUENOS AYRES MUTUAL GAS COMPANY.—This company are pushing on with a rapidity seldom seen in the River Plate. Gangs of men are constantly laying mains throughout the whole city, and this number is to be further augmented, so as to complete the contract with the municipality by March 1, 1874. Already the company have 1300 consumers in the district as at present laid, of which number 700 services have been fixed; and, as the district laid is only one-third of the whole, there is no doubt that the business will commence with 3000 to 4000 private consumers. This company hold the municipal contract for ten years from March 1, 1874, at 110 m/c per month per year, for not fewer than 4200 lamps, and this it is expected will be increased to 6000 within one year. The works are situated within a few squares from the river, on a site free from flood. The front offices are all complete, and present a handsome appearance; the coal store, blacksmith's and carpenter's shops are erected, also the retort-house and stables; the meter-house and engine-house will be complete by the end of next month, so that the bricklayer's work may be said to be nearly finished with the exception of the retort-house fittings. The following vessels are now unloading in the river:—The *Graafstroom*, the *Batavia*, *Lura*, *Santiago*, and *City of Lima*. The latter vessel has all the retorts on board, which are in capital condition. Thirty miles of pipes have already been laid, including some of the 18-inch and 15-inch, and the whole of the 12-inch in Rivadavia have been laid to the Once. Calle, Victoria, Piedad, San Martin, Bolivar, Parque, Corrientes, and Peru have also them partly laid, and will be continued as fast as material comes to hand. There can be no doubt the company will obtain great results; the business has been done well, done quickly, and done thoroughly, and as the company is a mutual one, already numbering the principal consumers amongst the shareholders, the result cannot be otherwise than 15 to 30 per cent. dividend if managed well. The whole of the plant, machinery, retorts, and buildings have been contracted for by Mr. George Bower, a person well known as a large maker of gas and water works, and we believe the whole of the fabric when complete will far exceed anything in South America. The gas business in Buenos Ayres is a splendid one; the mutual fabric is placed exactly in the right position, and the company holding the municipal contract, there can be no doubt the result will be highly advantageous to the shareholders if proper management be carried out.—*Buenos Ayres Standard.*

BOX'S IMPROVED ASCENSION-PIPES AND CONNEXIONS.

This invention is designed to meet, if not entirely prevent, a difficulty which so often occurs in the process of gas manufacture—viz., choked ascension-pipes, and consists in attaching to the ordinary socket of the retort mouthpiece another socket made in two halves, the front one being removable. The bottom of the H-pipe is also fitted in a similar manner. The ascension-pipe, or that part of it which occupies the space between the retort and the H-pipe, and in which the stoppage usually takes place, is made of wrought iron by preference, but not of necessity, as cast iron may also be used. When being fitted up, the



ends of the ascension-pipe are covered with luting and placed in the half sockets; the moveable half is then applied, and a close joint produced by claws, which take hold of lugs on the fixed part of the socket, and by a screw, which on being turned presses the loose half of the socket close to the other and to the ascension-pipe. It will be seen, therefore, that should an obstruction in the ascension-pipe take place, all that is necessary is to slacken the screws, take out the offending pipe, put a clean one in its place, and secure as before. This work of a few minutes thus suffices to give a clear ascension, instead of having to resort to the tedious, inconvenient, and dangerous process of "jumping." The foul pipe may then be burned or cleaned out at leisure.

PETROLEUM AND PINE TAR GASES.

Some time ago, it may be remembered, we called attention to the interesting and novel experiments, made by Professor Benevides of Lisbon, Portugal, upon the flame of compressed carbonized gas burning in free air. Ordinary illuminating gas and marsh gas (light carburetted hydrogen) were the subjects of the investigation. Recently the same author has conducted similar inquiries, in reference to gas extracted from the residues of petroleum and of the pine and fir tree, with even more remarkable results.

The gas derived from vegetable sources, used in the experiments, was obtained by the distillation of the residue left after the distillation of the roots, by employing a jet of steam at high tension, which was injected into the distilling cylinders. A liquid was produced from which turpentine was extracted, when there remained a black and thick fluid as residue. The latter, submitted to distillation, disengaged a combustible gas which for some time past has been employed for illuminating several lighthouses on the coast of Portugal. The petroleum gas was obtained by the distillation of the residuum of petroleum by the Hirzel system. The gases, thus arising, as well as those derived from the pine, are mixtures rich in hydrocarbureta, a phenomenon analogous to that observed with ordinary illuminating gas obtained by the distillation of coal, and contain, in variable proportions, protocarburet of hydrogen, bicarburet of hydrogen, carbonic oxide, carbonic and sulphydric acids, &c.

Coal gas possesses in general much of the protocarburet and little of the bicarburet. As the proportions of these gases are variable, the density and illuminating power of the mixture likewise vary considerably. The coal gas, as employed in the city of Lisbon and used in the course of the experiments, has a density of 0·4, and its illuminating power, as indicated by the Erdmann apparatus, is 29.

Pine gas has a very pronounced odour resembling that of burned turpentine; its density is 0·8, nearly double that of coal gas. It is a mixture very rich in carbon, and requires burners of special construction, with very small orifices, in order to avoid the production of smoke and bad odour, as happens when consuming the gas in the ordinary illuminating gas-burner.

The air which combines with the flame in the latter case is insufficient to ensure the combustion of the enormous quantity of carbon contained. The illuminating power of this pure gas is much superior to that of coal gas. In experiments with the apparatus above named, while the latter gas gave 29, the former produced an indication as more than 50. The graduation of the instrument stopping at this point (the maximum width of the slit), it was found impossible to cause the brightness of the pure gas-flame to disappear entirely, so that the full intensity of its illuminating power could not be accurately ascertained by this means. With the Bunsen photometer, experiments gave 5 to 1 as the ratio of the respective luminous intensities of pine and coal gas.

Petroleum gas possesses properties analogous to those of pure gas, but has, however, a different and very strong odour, similar to that of phosphuret of hydrogen. Its illuminating power is even stronger than that obtained from gas derived from coal. On burning petroleum gas in a Bunsen burner of ordinary dimensions, the brilliancy of the flame does not entirely depart, as the quantity of air drawn in is not sufficient to cause the consumption of all the contained carbon. When the cock of the rubber sack containing the petroleum or pine gas, under examination in the Bunsen lamp, is very slightly opened, the flame disappears from the upper portion of the burner and leaps to the inferior orifice of the tube. If, however, the said bag be pressed by the hands, the flame returns to the upper part of the burner. Although this experiment may be repeated as often as desired with the gases above named, it cannot be accomplished with coal gas, of which the flame, once produced at the inferior orifice, is not displaced, even if the same pressure be exerted upon the bag as before, thus indicating the greater mechanical energy of the former gases.

Combustion not being complete in Bunsen lamps of ordinary dimensions, the characteristic bands are not clearly defined in the spectra of pine and petroleum gases. The upper part of the flame gives a continuous spectrum, while that of the lower portion is channeled: the lines have the colours of the bands, while red appears at the extremity of the spectrum. On lighting a jet of compressed pine or petroleum gas, escaping from a tube, similar phenomena to those caused with coal gas are observed. With the former gases, however, the effects are amplified by the greater density and larger quantity of carbon contained. The velocity and the escape being great, the flame never commences at the orifice, but an intervening obscure space is produced. If a tube be employed having an exterior opening 1 millimeter in diameter, the flame of compressed coal gas presents no obscure point near the pipe; for if the cock be opened too wide, total extinction of the flame follows. With petroleum or pine gas, the contrary is the case; a quite large non-illuminated space appears near the escape orifice, and at the same time an oscillation of the luminous jet in the direction of its axis is perceptible. If the flame be observed from the side of the tube, a hollow central space, from which combustion is absent, can be perfectly discerned. This, the author considers, confirms his explanation to the effect that the velocity of a gaseous current is greater at the centre than at the surface of the jet, for the friction diminishes the velocity of the molecules of the exterior. The mechanical action of the current is also greater at the centre; the flame is projected to a greater distance, and there is a stronger displacement of the air in the region near the axis of the jet than at the periphery.

Another experiment gives additional support to this theory. If through a bent tube a current of air be directed upon the flame of compressed pine or petroleum gas, in the direction and path of the gaseous current, the obscure space augments, and the flame, drawing away from the orifice of the burner, may be projected so far therefrom as to be extinguished. In this case the air, it is believed, augments the mechanical action of the gas, in throwing the flame to a greater distance. If, on the contrary, a draught be applied to the jet in the direction of its axis, but in a path opposite to that of the current, the flame approaches the orifice, diminishing the obscure space until the same disappears and the flame begins directly at the escape opening. By this means the gaseous mass is impressed with a movement contrary to that which it possessed on leaving the compressing apparatus, which diminishes the velocity of escape of the current, and consequently its mechanical action on the incandescent portion. Again, if the air be injected transversely to the flame, the latter will deviate to the opposite side, through the composition of the motion which the jet had at the point of escape with that impressed by the draught; and at the same time the dimensions and form, both of obscure space and luminous jet, will vary.

Petroleum and pine gases having more carbon than coal gas, in order completely to ensure their consumption, more air is required than is necessary for the combustion of ordinary illuminating gas; and thus for compressed gases it is necessary that the velocity of escape be greater for those derived from petroleum and from pine than from coal, in order to have the highest temperature, and to cause the complete disappearance of the brilliancy of the flame. It is also for the same reason that the velocity of escape of the former gases should be greater than that of others less rich in carbon, to enable the spectroscope to exhibit with clearness the spectra characteristic of the flame of compressed gas.—*Scientific American.*

YOUNG'S APPARATUS FOR TAPPING WATER-MAINS.

The ingenious contrivance for tapping mains illustrated in the annexed engraving, is the invention of Mr. William Young, of Easton, Pennsylvania. It is said to perform its work with rapidity, avoiding waste of water, and to enable a perfectly secure connexion between the main and service to be effected. Fig. 1 is a perspective view, and Fig. 2 a sectional view of the apparatus. The two parts of the drill case, A and B, are clamped together by bolts, C, and have a hole formed half in each for the drill, E. At one end is a stuffing-box, F, and at the other a detachable washer, G, in a socket, having a concave face to be clamped against the packing gasket, H, on the side of the main, to make a watertight joint. Another gasket, I, is placed at the bottom of the socket. These gaskets and the washer are made in two parts, so as to be removed when the pipe is inserted, as the stop-cock on the latter, if they were in single pieces, would prevent their being slipped off over the end. J is the cock traversing the

Fig. 1

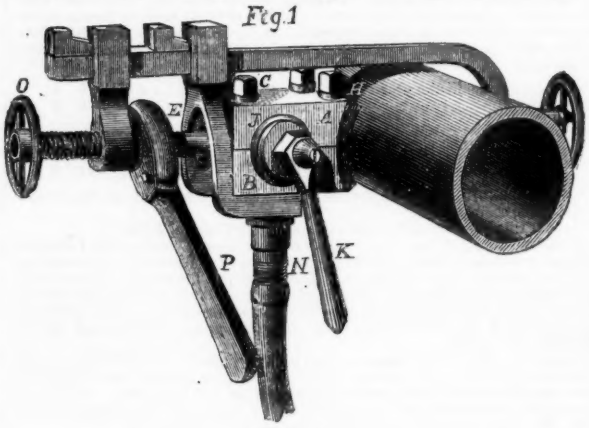
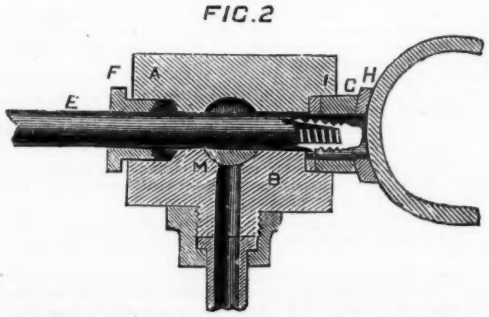
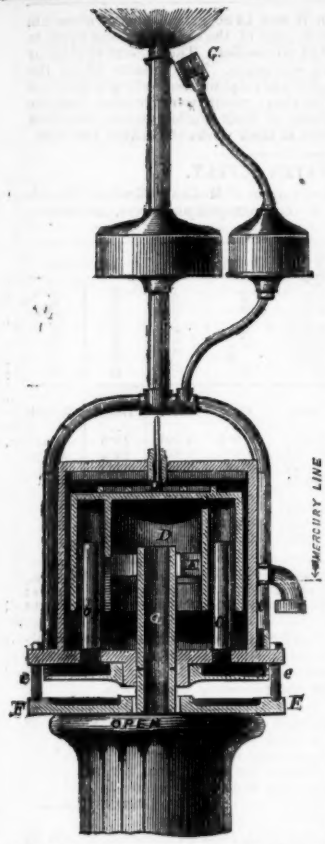


FIG. 2

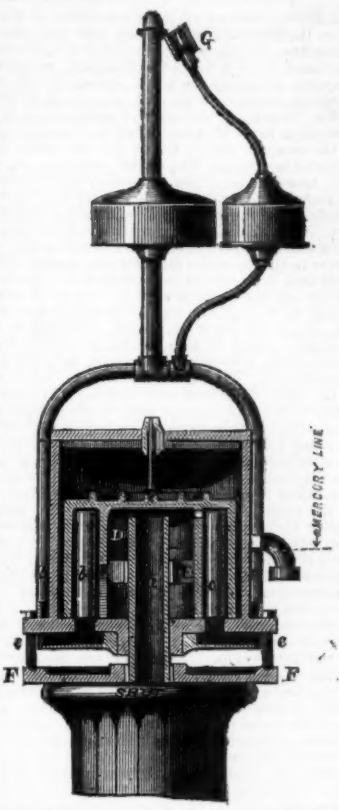


drill-hole to close it when the drill is drawn out. It has a handle, K, on the outside for turning it, and has a deep notch, L, cut in it, coinciding with the drill-hole, to let the drill pass into the pipe for making the aperture when it is adjusted to the position represented in Fig. 2. After the hole is drilled and the point of the drill is drawn back beyond the cock, the latter is turned so that the part, M, comes up and stops the orifice. The instrument is then removed, and the pipe to be screwed in is inserted. The cock being turned back again, the pipe is pushed forward and connected with the main, after which the apparatus is detached. The passage, N, for blowing out chips by the water, may either have a pipe connexion fastened to it for conducting the washings away by a flexible pipe, as shown, or it may be entirely closed by a screw cap, to be taken off when the drill case is to be washed out. The apparatus is clamped to the main by the ordinary clamps clearly represented. O is the feed screw for the drill, the latter being operated by the rachet pawl and lever, P.

WILSON'S AUTOMATIC LAMPLIGHTER.



The apparatus here described and illustrated has already been briefly noticed in our columns. It is the invention of Mr. Alexander F. Wilson, A.I.C.E., gas and consulting engineer of London; and consists of a chamber attached to the top of the lamp column, within which chamber is a small gasholder dipping into mercury, in a cast-iron ring tank furnished with an inlet and two outlet pipes. One of the outlets leads to the ordinary lamp burner, and the other to a small jet burner a little below. The gasholder is divided by partitions, which encircle the outlet-pipes, and one of these partitions—viz., that which surrounds the pipe leading to the ordinary burner, is made shorter than the other. The jet burner is kept constantly burning, gas being admitted to it by an orifice in the partition leading to it. On an increase of pressure in the mains the gasholder rises and unseals both partitions, so that the gas flows freely to both burners, the flame from the jet burner igniting the gas as it issues from the ordinary burner. On the pressure being lowered, the holder falls and seals the partition covering the outlet to the jet, leaving its supply of gas entirely to the small orifice, so that its flame is reduced to a minimum, while the supply to the ordinary burner is fully maintained, in consequence of the partition covering its outlet being shorter. To extinguish the lamps it is only necessary to reduce the pressure still further, and thus cut off all communication between the gas and the ordinary burner. The drawings show the apparatus open and shut. *A* is the inlet gas-pipe; *b* the outlet gas-pipe to burner; *C*, outlet to permanent jet; *D*, cup; E, float; *e*, adjusting bolts for levelling; *F*, resting-plate; *G*, windguard for permanent jet. To work this apparatus, the first thing to do is to ascertain the pressure at each lamp at lighting and extinguishing hours, compared with a standard at the gas-works. When this is done, and a maximum and minimum pressure decided upon, let corresponding lighters be fixed. Desiring to light up, let pressure be put on the mains, for safety, a few tenths above the maximum, when, allowing a space of about ten minutes to elapse for lighting, the pressure may be reduced as regulated at the various hours during the night. When the time for extinguishing arrives, reduce the pressure one or two tenths below the minimum cited, also allowing thereafter a short time to elapse so that the lamps may have been fully shut out. Replace the usual or any extraordinary day pressure that may be under the maximum or lighting point.



An Automatic Lamplighter worked by pressure in the mains, to be successful, must, we think, at least fulfil amongst others the following conditions, viz.:—1. It must not be too expensive. 2. It must be durable, easily fixed, and steady in action. 3. It must not be delicate or complicated in arrangement, so that it may be attended to by unskilled workmen. 4. It must not interfere, within certain limits, with the placing or withdrawal of pressure after the burners have been extinguished or re-lighted. 5. It must show a considerable margin of economy over the present system.

How far these essentials are met by the present invention will be more fully seen after a fair and practical trial; meanwhile it is claimed by the inventor to be inexpensive and easily fixed, without alteration of lamp or column, capable of lighting only at a maximum and extinguishing at a minimum pressure, there being a range betwixt these two extremes, which may be increased or diminished according to the area of the float; adjustable by weights, so that the maximum and minimum points may together be altered to suit altered pressure at different altitudes, the range remaining the same; not easily disarranged, there being almost no mechanical action, and being composed simply of a cup dipping in mercury within an iron tank, and buoyed or weighted by a hollow float, there is little likelihood of alteration by intense cold or immoderate warmth; and, lastly, kept alight, or rather lighted, by a permanent jet, the consumption of which may be regulated to from 3 to 4 cubic feet, and in any case need not exceed 5 cubic feet in 24 hours.

The following, amongst other beneficial results may, it is contended, be expected from the adoption of this improvement, viz.:—1. That public lamps will be lighted and extinguished simultaneously, thus preventing the waste occurring from too early lighting, and also the danger of localities being left in darkness after the hours when public safety demands that they should be lighted. 2. That an economy will be realized by delaying the time of putting on pressure in the evening. 3. That the lamp-lighting staff may be reduced to cleaners only, who would act as inspectors and repairers of any simple derangement that might occur. The economy is calculated by the inventor on the following basis—viz., a permanent jet, $\frac{3}{4}$ inch to 1 inch in height will consume, say, 5 cubic feet in 24 hours, from which, however, falls to be deducted the saving by simultaneity of lighting and extinguishing, say, $2\frac{1}{2}$ cubic feet in the same time, thus leaving a balance upon 1000 lamps of 2500 cubic feet, equal, at manufacturing cost price of 2s. per 1000 cubic feet, to 5s.

To light and extinguish 1000 lamps requires, at present, say, 10 lighters, whose wages, taking three-fourths only for this service (the remaining fourth being for cleaning), would amount to 30s. per day, leaving a balance in favour of the automatic lighter of 25s. per day, or per annum £456 5s., and multiplying this sum by the number of thousands of lamps in the metropolis alone, or even lighted by such companies as the Imperial or the Chartered, an idea may be formed of the value of the appliance.

As, at least, an ingenious yet simple contrivance, based apparently on sound scientific principles, we cannot but hope that it may be found to answer and come into general use.

Gas Explosion at Kew.—On the evening of Sunday, Nov. 2, shortly before five o'clock, a gas explosion occurred at the Kew Gardens station of the London and South-Western Railway, causing considerable alarm and destruction of property. The head porter had just completed the gas lighting in the waiting-rooms and booking-office when a very loud report was heard. All the windows of the two waiting-rooms, some of which were of plate glass, were shattered to pieces, and scattered to a distance of between 30 and 40 yards. The ceilings in the booking-office and both waiting-rooms came down with a crash, the joists were broken, the slate roof lifted from the walls about 9 inches, and a great deal of other damage was done. A porter was knocked off a truck, whilst a passenger, who had that moment taken his seat in the waiting-room, had his hat blown across the line, and his face and neck cut by some glass falling on him. A lady sitting between the windows outside had a very narrow escape, and the bells at the signal-box—over 100 yards away—were loudly rung. The interiors of the waiting-rooms were quickly in flames, and the porters and passengers had all to set to work with buckets of water to extinguish the fire. The cause of the explosion is said to have been a leakage from a pipe between the ceiling and roof.

Carlisle (Corporation) Gas and Water Works.—At the monthly meeting of the Town Council on the 11th inst., the Gas Committee presented a report upon the gas-fitting trade carried on by them during the year ending June 30 last, from which it appeared that the profit realized amounted to £276 13s. 2d. The account appended to the report showed that on June 30, 1872, the stock of fittings amounted to £1488 8s. 10d.; fittings purchased in the year, £1188 12s. 6d.; wages paid for fitting, £311 18s. 3d.; total, £2988 19s. 7d. The stock of fittings on June 30, 1873, was £1494 6s. 9d.; fittings sold as per day books, £1771 6s.; total, £3265 12s. 9d. The report stated that the committee, from the experience they had had in the matter, were of opinion that both the corporation and the public would benefit by the continuance of the gas-fitting trade as heretofore. Mr. Hargreaves, who had a notice of motion on the books to the effect that the Gas Committee discontinue that part of their trade in gas-fittings which encroached upon the sphere of ordinary tradesmen, having been made a member of the Gas Committee, proposed to hold over his motion for a year, during which time they would see how the question worked. He said the principle he wished to give effect to was that the corporation should not interfere with tradesmen. He thought it an improper thing that they should interfere with trade that ratepayers could do; but if that interference was done at a fair profit it lost much of its objectionable character, because it was not entering into unfair competition. With the consent of the seconder of his motion (Mr. Todd), he would withdraw it until the end of the year, when they would have a better opportunity of testing the question. Mr. Todd was disinclined to drop it altogether. He was still strongly of opinion that it was wrong to interfere with the tradesmen of the town. They made no such interference with water-fittings. Why not keep a stock in that department on hand if the principle was right? The notice of motion was ultimately withdrawn.

Rugby Gas Company.—At a sale which took place at the George Hotel, on the 4th inst., a number of shares in the Rugby Gas and Coke Company were submitted to competition, and brought very good prices. Stock equal to £47 10s. made as high as £101 10s. in one instance, and in no case less than £101; one lot equal to £46 13s. 4d. stock made £100 10s.; and two lots of £40 made respectively £86 and £85.

Nottingham Gas and Water Companies.—At a special meeting of the Nottingham Town Council, held on Wednesday last, Alderman Thackeray read a report from the Gas and Water Committee on the proposed application to Parliament for powers to purchase these undertakings. He stated that no agreement had been come to with the companies, and the adoption of the committee's recommendation was necessary to place the corporation in a position to carry out their intention. Alderman Hardy thought that before adopting the report the council should know whether it was proposed to pay these companies 6 or 7 per cent. He had been told that the difference between them and the council was, that whilst the corporation were willing to pay 6 per cent. the companies wanted an additional 1 per cent. A difference of 1 per cent. would make £100,000 difference to the town. If the committee gave more than 6 per cent. he should oppose it. Alderman Barber said the object of those who opposed was to throw the thing overboard another year. Perhaps that would be better than putting the town to the extra cost of £100,000. Alderman Thackeray said the committee had no power to offer either of the companies 7 per cent. They had been authorized to offer 6 per cent. or £75 per share in money, and beyond that they could not go. The town-clerk said the council were called together to comply with the requirements of the Borough Funds Act. That Act gave the council power to promote bills, but said that no expense shall be charged on the borough rate for promoting any Act, except consent was given by an absolute majority of the Town Council. The motion was then put for assenting to the bill for promoting the acquirement of the gas supply, when only 24 votes were given for it. A Councillor: "It is lost." The Town-Clerk: "It is not lost; but you cannot charge the borough fund." Alderman Thackeray explained that if it was necessary to go to Parliament, supposing no arrangement to be arrived at, the expense would come out of the borough fund. Otherwise, if they went to Parliament they were liable to pay the money out of their own pockets. It was simply a formal matter. When the proper time came, those who objected could oppose the council taking either the gas or water concerns, because they could not go to Parliament without the sanction of the hall. The question was then put as to the purchase of the water-works, when 31 votes were recorded in favour of the proposition, which, being more than a majority of the whole council, gave the required consent. At a subsequent period of the meeting, Mr. Heath moved the following:—"That all expenses connected with the getting of an Act of Parliament for the transfer of the gas-works company's plant and property to this corporation be paid out of the borough funds, and that such moneys be paid from time to time by the Finance Committee." Mr. Belk seconded the motion, which, on being put, was carried by thirty-three votes against one.

ALLIANCE AND DUBLIN CONSUMERS GAS COMPANY.

A Special Meeting of the Corporation of Dublin was held on the 1st inst., when the TOWN-CLERK, having read the minutes of proceedings of the Gas Committee, including a communication addressed by them the previous day to the board of the Alliance Gas Company, requesting to know whether they were prepared to transfer the whole concern to the corporation on the terms of the company, receiving 5 per cent. per annum dividend on the paid-up capital,

Mr. BYRNE, in moving the confirmation of the resolution passed by the council on Sept. 30, to the effect that application should be made to Parliament in the ensuing session for an Act to enable the corporation to purchase the undertaking, works, &c., of the company; or, in the alternative, for power to raise money to erect new gas-works, and directing the law agent to take the necessary steps in the matter, under the supervision of the Gas Committee, briefly stated the existing circumstances connected with the gas supply of the city. He stated also that, under an Act of last session, a gas company able to show fair management of their business might apply to the Board of Trade for power to charge such a price for gas beyond the maximum price authorized in their own Act as would be sufficient to pay their shareholders 5 per cent. per annum on the paid-up capital. By their Act the Alliance Company could charge 5s. 4d. per 1000 feet for 20-candle gas next year, and 5s. subsequently; but, under the Act of last session, applying to all gas companies, the Alliance Company would be able to charge such a price, no matter what, as would enable them, with fair management, to pay a dividend of 5 per cent. to their shareholders. The council had now to consider the question of the gas supply in the light of this new state of things. If the corporation took over the company, they would take the place of the company, and be in a position to avail themselves of this new piece of legislation; consequently, in offering to the company a dividend of 5 per cent. per annum on the paid-up capital, the corporation incurred no risk whatever, because they would be enabled to obtain from the consumers of gas a price, after the payment of all legal expenses, equivalent to 5 per cent. upon all the paid-up capital. Upon the other hand, if the corporation did not take over the gas company, the company might realize the 5 per cent.; and whatever they realized over that they might, if they liked, spend upon unnecessary enlargements of their works, or in other ways of useless expenditure. And it should be further observed that, although the general Act enabled them to reach 5 per cent. dividend in the most adverse circumstances, under their local Act they had the power, if coal went down in price, and there was a return to the state of things of two years ago, to pay 10 per cent. dividend to their shareholders. It was, therefore, in his opinion, of great consequence to the corporation that they should have the management of the gas supply. They could not lose, for they would have the power to realize the 5 per cent. which they offered to pay, and a reduction in the price of coal and an improvement in the management would enable them to offer the whole of the citizens substantial advantages. In connexion with the matter it should be borne in mind that their contracts with the company for the public lighting of the city terminated on Dec. 31, 1876. The present price paid under it was 3s. 10d. per 1000 cubic feet. At the end of the contract the price might be raised to 7s. 6d. per 1000 cubic feet for 20-candle gas. In alluding to the price of the gas, he might mention that the improvement-fund had benefited to the extent of £4500 by the arrangement carried out six years ago with the gas company in relation to the supply, but when the contract terminated of course a new arrangement should be made if the corporation had not taken over the company. Another matter to be considered was the quality of the gas supply. For the last ten days the supply was certainly not satisfactory, nor did he think it would become so as long as the business was in the hands of the company. Next to the duty of procuring a good water supply, the duty of securing a good gas supply ought to engage the earnest attention of the council, who were the body Parliament would recognize as authorized to speak for the citizens in that matter. Under these circumstances, believing it would be for the interest of the citizens to take over the gas-works, paying the company 5 per cent. dividend, he felt pleasure in moving the confirmation of the resolution of the 30th of September.

Mr. O'NEILL seconded the resolution.

Mr. DENNEHY opposed the motion, and said when the former bill was being promoted they were told that the profit to the corporation for taking over the company would be £46,000 a year. Now it appeared that not a single shilling of profit would have been realized this year. The corporation were to have taken up the works from Jan. 1, 1873, and he saw no profit likely to be realized at that date. In his opinion, the reports upon which the council were asked to act upon on the previous occasion were bundles of unmitigated rubbish. Every assertion in them had been falsified. They were told that if they did not at once buy up the works, they would have to pay £50,000 more for them, if they would get them at all. Let them contrast that prophecy with the offer of 5 per cent. now made. He concluded by moving as an amendment that no action be taken in the matter for one month, but, after some discussion on the point of order whether this really was an amendment to the motion before the court, he withdrew the same.

Mr. VEREKER then moved an amendment, declaring that it was undesirable to promote the bill, which was seconded by Mr. FRENCH, and negatived.

The motion was put, and carried by 13 to 10 votes.

At a Special Meeting of the Council on the 10th inst., Mr. DENNEHY gave notice of a motion to the effect that, inasmuch as the resolution to proceed with the promotion of a bill in Parliament for the purchase of the Alliance Gas Company's works was only carried by a majority of three, two of whom had been connected with the company, the House of Commons, under the circumstances, would be unlikely to pass such a bill, and that all proceedings in relation thereto should cease.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone:—

OCTOBER, 1873.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 25 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Company's gas	16·96	18·30	16·00	21·59	10·21	18·71	0·70	None.
Chartered Company's common gas	16·92	17·61	16·20	27·28	13·74	14·86	0·60	None.
Chartered Company's cannel gas	20·51	21·40	19·72	21·38	12·08	23·45	0·06	None.

Mean of daily readings of barometer . . . 29·64
" " " thermometer . . . 58·05

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during the month was equal to the light of very nearly 17 candles, it ranged between 16·00 and 18·30 candles; on fourteen occasions it exceeded 17 candles. The mean amount of sulphur found in 100 cubic feet of this gas was 18·71 grains, and of ammonia about three-fourths of a grain. The mean light of the Chartered Company's gas was equally good, it ranged between 16·20 and 17·61 candles; the mean quantity of sulphur found in it was 14·86 grains, and of ammonia rather more than half a grain. The mean light of the cannel gas was equal to 20½ candles, it ranged between 19·72 and 21·40 candles. The amount of sulphur found was 23·45 grains, and of ammonia one grain. The pressure of all the gases was generally good, and on no occasion was sulphuretted hydrogen detected in either of them by the usual tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works at Beckton and Bow.

METROPOLIS WATER SUPPLY.

The following are the returns of the Association of Medical Officers of Health relating to the composition and quality of the metropolitan waters, in October, 1873:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. As Nitrates, &c.	Nitrogen. As Ammonia.	Hardness. Before Boiling.	Hardness. After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	...	...	...	...	...	...
West Middlesex	17·11	0·018	0·083	0·001	13·8	3·3
Southwark and Vauxhall	17·97	0·053	0·086	0·002	14·3	3·3
Chelsea	18·00	0·058	0·088	0·001	14·2	3·3
Lambeth	18·10	0·044	0·091	0·002	14·3	3·3
Other Companies.						
Kent	28·69	0·013	0·249	0·000	21·8	5·9
New River	17·61	0·027	0·110	0·001	14·0	3·3
East London	18·67	0·040	0·125	0·001	14·8	4·0

Note.—The amount of oxygen required to oxidise the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was very slightly turbid—namely, in those of the Southwark, the Chelsea, and the Lambeth Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Association of Medical Officers of Health, 118,874,212 gallons; and the number of houses supplied was 505,295. This is at the rate of 35·4 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 24·9 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne.

HY. LETHEBY, M.B.

The Registrar-General publishes the following returns, furnished to him by the London water companies, of the average daily quantity of water supplied for the month of September, 1873. According to their returns, 118,874,212 gallons, or 540,100 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 235·3 gallons (106·9 decalitres), rather more than a *ton* by weight, to each house, and 33·1 gallons (15·1 decalitres) to each person. According to the returns of the London water companies made to the select committee on East London Water Bills (session 1867), it is estimated that during the year 1866 about 82 per cent. of the total supply of water for all purposes was for domestic use. Applying this proportion to the total quantity supplied daily in the month of September, 1873, it may be estimated that about 97,476,854 gallons were probably used for domestic purposes, or about 27·2 gallons per day for each inhabitant, against 26·6 in the corresponding month of last year. This proportion no doubt varies from month to month, but the Registrar-General has no means of giving a more exact estimate.

COMPANIES.	Number of Houses, &c., supplied in Sept., 1872.	Number of Houses, &c., supplied in Sept., 1873.	Aver. Daily Supply of Water in Gallons* during Sept., 1872.	Aver. Daily Supply of Water in Gallons* during Sept., 1873.
Total supply	498,574	505,295	114,696,589	118,874,212
From Thames	232,640	237,072	58,924,214	62,866,734
" Lea and other Sources	265,934	268,223	55,772,375	56,007,478
THAMES.				
Chelsea	28,154	28,270	9,448,100	8,371,000
West Middlesex	43,930	45,041	9,894,049	9,590,863
Southwark and Vauxhall	78,985	79,506	16,460,125	19,496,752
Grand Junction	33,013	34,243	11,385,940	11,821,919
Lambeth	48,558	50,012	11,736,000	13,586,200
LEA AND OTHER SOURCES.				
New River	120,472	121,601	27,266,000	26,602,000
East London	104,196	104,481	21,334,400	22,655,550
Kent	41,266	42,141	7,171,975	6,749,928

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for September, 1873, as compared with that for September, 1872, shows an increase of 6721 houses, and of 4,177,623 gallons in the daily supply of water.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone:—

OCTOBER, 1873.	Total Solid Matter in degrees or grains per Imperial gallon. Oct., 1872.	Total Solid Matter in degrees or grains per Imperial gallon. Oct., 1873.	* Loss by incineration of Solid Matter in previous column. Oct., 1872.	* Loss by incineration of Solid Matter in previous column. Oct., 1873.	Hardness before boiling in degrees.	Hardness after boiling in degrees.
Distilled Water	0°	0°	0°	0°	0°	0°
West Middlesex water	17·52	18·52	0·70	0·84	12·72	2·90
Grand Junction water	17·56	19·00	0·80	0·92	13·00	3·05

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During October the water of both companies as drawn from the mains was clear; that of the West Middlesex Company was, as usual, bright and well filtered. As compared with the corresponding month of last year, the water of both companies contained a slight excess of both organic and inorganic matter.

Dr. Frankland reports that all the samples of water supplied to the metropolis during the month of October were clear and transparent when drawn from the companies mains. The river waters had, therefore, been efficiently filtered. Taking the amount of organic impurity contained in a given volume of the Kent Company's water as unity, the proportional amount in an equal volume of water supplied by each of the other metropolitan companies was—New River, 1·1; Grand Junction, 1·8; West Middlesex, 2·0; Chelsea and Southwark, 2·1; East

London, 2·6; and Lambeth, 2·6. The Lambeth Company, notwithstanding the removal of its intake to a point higher up the Thames, still delivers water inferior in quality to that of any other company. The above comparison shows, however, that the river waters continue to maintain the improved quality which they acquired during the summer months.

The Kent Water-Works Company have issued an intimation to the Metropolitan Board of Works that upon and after the 1st of March next they propose to give a constant supply of water to such part or parts of the company's water limits as are comprised within the following district, that is to say:—So much and such part or parts of the parish of Saint Nicholas, Plumstead, as is or are contained within a line drawn from the point in the centre of the Plumstead Road where the western boundary line of the said parish crosses the road, and following south the said boundary line to the centre of the Anglesea Road, thence in an easterly direction along Anglesea Road, Conduit Road, Raglan Road, Durham Road, and Park Road, to its junction with Griffin Road, passing northward along Griffin Road so far as Glyndon Street, and thence eastward to the south corner of Park Brewery, in Cage Lane, thence in a direct line to the Old Manor House in Wickham Lane, thence northward down Wickham Lane and Church Manorway to the South-Eastern Railway, thence westward along the railway line to Griffin Manorway, and thence along the Plumstad Road to the western boundary line of the said parish, the houses abutting on either side of the several streets named in the aforesaid line being included.

At the meeting of the Metropolitan Board on Friday, the Works Committee reported on the above communication. They stated that the notice was served upon the board, as the metropolitan authority, in compliance with the 12th section of the Metropolis Water Act, 1871, which requires that when any company proposes to afford a constant supply they shall state accurately the district in which it is to be given, and the day, not being earlier than four months from the date of the service of the notice, upon which the supply is to commence. By the 9th section of the Act it is provided that if the board object to the proposal they may, within one month from the service of the notice, present a memorial to the Board of Trade, setting forth their objections to the proposal, the board also giving the company notice of the presentation of the memorial, and furnishing them with a copy of it; and the Board of Trade are empowered to institute inquiry into the matter, and to make such orders thereon as may seem to them just. The committee having duly considered the notice, and received from the engineer a report and plan showing the district to be supplied, were of opinion that no objection should be made to the proposal of the company, and they recommended in accordance with that view. At the instance of Mr. Newton the recommendation was carried, without comment.

Society of Arts.—In the premium list just issued by this society, amongst the general prizes (gold and silver medals) is the following:—*Elastic Tubing.*—For an elastic material for tubing suited to the conveyance of gas, and not liable to be affected by moisture, alterations in temperature, or to be acted upon by the gas itself.

Church Stretton Gas Company.—A meeting of shareholders was held on the 29th ult., for the purpose of considering what steps should be taken in reference to the affairs of the company. It was resolved to have a voluntary winding up, and Mr. Wm. Hyslop, of Church Stretton, and Mr. James Bunkle, of Waterloo Street, Birmingham, were appointed liquidators. The extent of the liabilities and assets is not yet known.

Hull Gas Supply.—The report of Mr. Baynes for the month of October shows that the quality of the gas supplied by the British Gas Company in the Sculcoates and Myton districts a little exceeded 14½ candles. On the 6th of the month traces of sulphuretted hydrogen were found to be present, but as they had entirely disappeared by the 8th, and no traces have since been detected, it probably arose from some temporary accidental circumstance; in all other respects the chemical purity was satisfactory. The results for the month, with Sugg's standard burner, are:

	Max.	Min.	Mean.
Illuminating power, standard sperm candles .	14·89 ..	14·32 ..	14·59
Grains of sulphur per 100 feet	29·10 ..	20·30 ..	25·44
Grains of ammonia per 100 feet	— ..	— ..	0·50

Mean barometer and temperature in experiment room—bar., 29·90; temp., 61°.

Presentation of a Second Testimonial to Mr. Joseph Clark.—On Monday, Nov. 3, the *employés* at the Pancras station of the Imperial Gas Company assembled for the purpose of presenting a handsome silver claret jug and pair of goblets to their retiring engineer, Joseph Clark, Esq. The presentation was accompanied by an address from the men, which was read by Mr. Rolfe, station clerk. Mr. Clark, amid loud cheering, thanked the men for the testimonial, and also for the very kind expressions and good feeling displayed towards him by them all. He assured them this very handsome present would be a valuable keepsake to remind him of their kindness as long as he lived. The health of Mr. John Clark and other toasts were proposed and drunk with great enthusiasm, including the committee of management, who took much trouble to bring the affair to a successful issue. Mr. Clark and the visitors then retired amid loud cheering, after which the men were liberally served with refreshments in a very satisfactory manner. The decorations and general arrangements, under the direction of Mr. G. Horton, were such as to afford general satisfaction.

Cremation.—An eccentric will, wherein the testator requested that his body might be consumed in a gas-retort, and thus made to contribute to the enlightenment instead of the poisoning of the world, has revived the long-forgotten subject of cremation. Without doubt Mr. Trelawney's hideously graphic description of the burning of the body of Shelley has greatly contributed to prejudice the public mind against the cleanest and best method of getting rid of the "mortal coil." But the ceremony at Spezzia was conducted in the most bungling fashion, and a want of scientific appliances contributed to the incompleteness and, therefore, to the horror of a simple operation. A retort gets rid of the entire difficulty, and both from a utilitarian, a scientific, a sanitary, and a poetic point of view, the mausoleum, decked with cinerary urns, possesses advantages over the damp and unwholesome graveyard, exhaling pestiferous odours, to which modern nations—for some inscrutable reason—are preposterously wedded.—*Iron.*

Alleged Death from Poisonous Gas.—An adjourned inquest was held at Deptford, on Wednesday, the 12th, before Mr. C. J. Carttar, coroner, into the circumstances attending the death of Henry Wood, a workman, employed at Fenner's Tar-Distilling Works, Deptford Creek. The duties of the deceased were to attend to a still, at which, it was stated, he was in the habit of working 24 hours at a time, with an unskilled assistant, whose aid enabled him to rest every three hours if he chose. The still he worked at was in the open air, but in a building on the premises was another still for the manufacture of anthracene, and which, it was acknowledged by one of the foremen, gave off a vapour of an unpleasant character. Deceased had for some time complained of a burning sensation at the chest and in the throat. On Monday, the 27th ult., he left work twice, and became so ill on the last occasion that he had to be removed to the house of one of the workmen on the premises, where he died before medical aid could be obtained. A *post mortem* examination had been made by Dr. Fisher, who deposed that he could neither trace heart disease nor any other disease, all the organs being healthy; but a most offensive smell came from the body, which presented all the appearances of having been impregnated with poisonous gas. Mr. Clench, the manager, stated that he could not tell if sulphuretted hydrogen was given off in the distillation of anthracene, in which, however, there was 97·75 of pure carbon; and, in answer to a question, said that deceased's attendance could not be dispensed with for less than 24 hours, the time it took to work off the charge in the still, it being impossible to put unskilled men to the labour. The inquest had been adjourned upon this evidence, to enable the coroner and jury to view the works, and to obtain the opinion of an analytical chemist as to the effect likely to be produced upon the human body by the manufacture of anthracene. Professor Rodgers now attended, and stated that as the result of his examination there was no such poisonous gas evolved as was supposed, and that in his opinion death in the present case arose from congestion of the lungs. The jury thereupon returned a verdict of "Death from natural causes."

Aberdeen (Corporation) Gas-Works.—At the last meeting of the Town Council of Aberdeen, held on the 29th ult., the Gas Committee reported the completion of a considerable extension of the works, the effect of which, as stated, will be to enable as much gas to be made in any twenty-four hours as can be consumed in that period. The committee also submitted an estimate of the revenue and expenditure connected with the gas supply for next year, showing a surplus of £109 11s. 7d., and recommended that the price of the gas be continued as formerly at 5s. per 1000 feet, with the usual discounts to large consumers, and 4s. 8d. per 1000 feet to the public lamps, without any discount. Bailie Urquhart, in moving the adoption of the report, stated that they were enabled to propose that the gas be continued at the present price in consequence of a surplus over the last two years. In 1871-72 they had a balance of £2433 15s. 9d., and on the year just concluded the net profit was £401 4s. 11d.; but for these sums the gas would require to have been raised at least 5d. per 1000 feet. At the commencement of the past year it had been estimated that they would have a balance of fully £1000 at its termination, whereas the surplus, as he had stated, was £2835, a result which must be regarded as extremely satisfactory. It was due to their having had good contracts for coals; and in referring to this point he might mention that recently they had received two offers from persons ready to supply coals at about 10s. per ton less than was asked two or three months ago, but he rather thought these offers were due to exceptional causes, and that they could not expect to get their whole supply cheaper than they had been doing. Bailie Esslemont stated that the salaries and wages now paid were less by £500 than when the gas-works came into the hands of the Town Council. He believed that the complaints regarding the quality of the gas had been greatly exaggerated, and mentioned that when the gas company gave over the works they were in the course of renewing old meters, which, it was thought, might have been registering too slow, and to the substitution of new meters might be due part of the increased gas accounts which were talked of. An analysis of the accounts, while it would show an increase, would yet not display so great a rise as had been said to have taken place; and when they remembered that coals had risen from 20s. to 45s. per ton, and they were still getting gas at 5s. per 1000 feet, there was no cause for grumbling. The report was adopted.

Birmingham Water Supply.—Dr. Hill, the medical officer of health for Birmingham, reports that the water supplied to that town during October was turbid from large suspended particles, and was very much in need of filtration. This, he considers, probably accounts for the continued high proportion of organic nitrogen. The ammonia continues to diminish.

Glasgow Water Supply.—Professor Bischof, of the Andersonian University, Glasgow, reports that the water supplied to that city from Loch Katrine during October was yellow and unusually turbid when seen through a stratum 150 millimètres thick. He considers that the turbidity fully explains the large increase of organic elements.

Hull Water Supply.—On Thursday, Nov. 6, Alderman Chapman, the chairman of the Water-Works Committee, laid the foundation-stone of a new engine-house at Springhead. The building will be erected directly over the site of one of the largest of the springs, and when the additional engine power is brought into play, the great supply of water there obtainable will be sufficient for the wants of the inhabitants of this town for many years to come. According to the engineer's periodical reports, there is a daily yield at these springs of 10 million gallons. The present requirement of the town is not half that quantity, and allowing the borough to extend as rapidly as the most sanguine of the speakers at Springhead predicted, the supply is at least sufficient for nearly a century to come.—*Eastern Counties Herald.*

Glasgow Water-Works.—At the meeting of the Corporation Water Committee, on the 3rd inst., Mr. Gale, the engineer, presented his quarterly report, which stated that the amount of water in store on the 25th ult. was—111 days supply in the lochs, 19 days in Mugdock reservoir, and 148 days in the Gorbals reservoir. As the autumn had been exceptionally wet, a large quantity of water had been wasted from Loch Venachar. The quantity of water sent into the city and districts for the quarter was 28,280,000 gallons a day from the Loch Katrine works and 4,200,000 gallons from the Gorbals, in all 32,480,000 gallons a day; being 1100 gallons a day less than for the corresponding three months of 1872. Taking the population at 630,000, the daily consumption at present would therefore be 51½ gallons per head. During the last three months all the remaining connexions between the two previously existing and the two new lines of mains from Mugdock to Canniesburn had been completed, and the pipes were now in regular use for the supply of the city. Several breakages had been reported during the quarter, and the repair of these, it was suggested, should be proceeded with without delay.

Liverpool Water Supply.—Prevention of Waste.—The borough engineer has just issued a most important report upon the expenditure incurred in connexion with the erection of stand-pipes and in the prevention of the waste of water in Liverpool. At the beginning of the year the estimated sum to be expended for the erection of stand-pipes, doing other work, and establishing a testing and stamping office under the new regulations, was £3250. In consequence of the adoption of special measures for the prevention of waste and the restoration of a constant service, the erection of stand-pipes was proceeded with more rapidly than was at first contemplated, and experiments are now being made in 14 districts, containing a population of 31,000 souls. The expenditure upon these works has been £7239, or £3989 in excess of the amount voted, showing how little reliance can be placed upon estimated expenditure many months before it actually takes place. The borough engineer, however, explains that of this excess the sum of £2394 is for the renewal of plant which would in a short time have had to be undertaken under any circumstances, and adds: "What has been done has been simply to carry out systematically in a few months work which would otherwise have extended over a longer period." In reference to the benefits derived from the measures, Mr. Deacon says: "The results of the operations in the 14 selected districts are that, instead of the former intermittent service of eight or ten hours, a constant service is now given, with a consumption of water less by about four gallons per head per day over the entire population, being equal to a saving of 124,000 gallons per day. At the present selling price of water in Liverpool, this reduction in the consumption represents a gain of £1700 per annum, and a constant supply to 31,000 people. In four of these districts there are works still in progress, and when they have been completed it is expected that the average consumption will be still further reduced, and that the total money value of the water saved will be considerably greater than at the present time. If the measures described above are continued to the end of the year at the same rate, a further expenditure of about £3000 will be incurred. The additional vote required will in that case be for £7000."—*Liverpool Mercury.*

Register of New Patents.

216.—Stevens, L., Washington City, U.S.A., "*A process for forming carbonic oxide from oxy-hydrogen vapour or steam, and an apparatus for utilizing the same for heating purposes.*" Patent dated Jan. 18, 1873.

This invention consists in the discovery of the conditions by which carbonic oxide or protoxide of carbon is formed from oxy-hydrogen vapours or steam; also in distilling bituminous coal, asphaltum, pine wood, and, in fact, any substance that will distil a carbon or hydrocarbon vapour or gas, which vapour or gas is used in the disintegration of oxy-hydrogen vapour or steam. The invention further consists in the application of carbonic acid or protoxide thus formed to steam-boilers, furnaces, and all places where heat is required; this being effected by the use of any suitable number of retorts, which are set so as to be heated by the same furnaces which serve for the steam-boilers. These retorts are charged with any suitable or convenient substance which will produce a carbon or hydrocarbon vapour by distillation, and at the proper time. Superheated steam (from an apparatus also heated by the furnaces) is let in at a temperature at which the carbon is decomposed. Protoxide of carbon and free hydrogen are thus evolved, and the gases thus produced are led by suitable pipes into the furnaces. Provision is also made for the introduction of oxygen from the air for the complete combustion of the gases thus introduced.

220.—Hawkins, J. G., Gas-Works, Sheffield, "*Improvements in apparatus used in the manufacture of gas.*" Patent dated Jan. 18, 1873.

The object of this invention is to relieve the retorts from unnecessary pressure when in action, by removing the seal in the hydraulic main, and so arranging the apparatus that when the retort is not actually employed in making gas, the dip-pipe, or its equivalent, shall become automatically sealed. The invention consists in enlarging within the hydraulic the ordinary dip-pipe, and making an opening therein, which is covered by a plate capable of adjustment. The plate carries a short curved pipe, which passes through it, one end entering the dip-pipe and the other raising within the body of the hydraulic to a height somewhat greater than the corresponding part within the dip-pipe.

The hydraulic being supplied with liquid to a height level with the top, or rather above the curved pipe in the dip-pipe, the liquid will flow into and fill the curved pipe; but as soon as any gas is evolved in the retort the gas will, in its endeavour to escape into the hydraulic main, force the water out of the curved pipe, and maintain for itself a free passage. When the gas ceases to come over, however, either from the opening of the lid or otherwise, the liquid in the dip-pipe will immediately flow into the curved pipe, and effectually seal the gas way. Should the curved pipe become choked from any unforeseen cause, the gas will flow down the dip-pipe and escape from its bottom edge in the ordinary manner.

236.—Stidder, J. G., Southwark Bridge Road, Surrey, "*Improvements in apparatus for drawing and preventing waste of water from pipes, mains, cisterns, and other sources, also ball and supply valves for domestic and other purposes.*" Patent dated Jan. 20, 1873.

This apparatus works by a fork lever on top, which has a roller working a cam, and the other end of the cam controls the ball-valve. There is a rod leading from the top lever to the discharge-valve in the cistern. In no case can the supply-valve and the discharge-valve be open at the same time. The lower division forms an after charge. The lavatory supply-valve works with a plunger, which works the spindle through a stuffing-box; to the other end of the spindle is fixed a bucket leather, or piston, which works in a chamber in the inside of the other case. This arrangement stops all concussion in the pipes when at work. The urinal valve works exactly the same as above in the lower chambers, but the inside comes away from the front of the valve when the cap is unscrewed. The ball-valve works with three levers, which is treble compound motion; the last lever works against the seat on the inside of the valve and shuts off the water under any pressure. The connexion for urinals forms a stuffing-box, which passes through the slates, with a fly-nut and union on the back and socket and union on the front. This motion saves the breaking of slate-joints to get at the union on the back.

248.—Robertson, J., Nitshill, N.B., "*Improvements in machinery or apparatus for forcing, exhausting, or measuring air, gas, or other fluids or liquids.*" Patent dated Jan. 21, 1873.

The feature of novelty which constitutes this invention consists in arranging on a shaft or spindle at the interior of a cylinder or casing one or more rollers or discs provided with slide-valves. An opening is formed in the cylinder or casing at one side of the valve or valves, through which the air, gas, or other fluid or liquid passes or is drawn thereinto, and on the rollers or discs being rotated by the shaft or spindle, is forced out through another opening situate at the opposite side or sides of the slide valve or valves. The apparatus may also be employed for measuring.

257.—Newton, A. V., Chancery Lane, Middlesex, "*Improvements in apparatus for applying steam to the raising and forcing of water and other liquids.*" A communication. Patent dated Jan. 22, 1873.

This invention relates to the construction and use of what are known as steam vacuum pumps, in which steam is condensed to form a vacuum, into which water is raised by atmospheric pressure, to be discharged either by gravitation or steam pressure on the admission of a fresh discharge of steam.

266.—Jacobsen, F., Edinburgh, "*Improvements in treating sewage for the purpose of making manure and purifying sewage.*" Provisional protection only obtained. Dated Jan. 23, 1873.

This invention consists in mixing phosphate of lime with sulphuric acid, which is diluted with sewage instead of with clean water, whereby a superphosphate is produced, which is then mixed with the more solid sewage deposit obtained by any of the known methods for producing subsidence and decantation.

274.—Patterson, R. H., Hammersmith, "*Improvements in the purification of coal gas, and in the production of alkaline sulphides to be employed for such purpose.*" Patent dated Jan. 28, 1873.

This invention is as follows:—1. *Production of Sulphides of Potassium.*—A solution of caustic potash is employed in a washer, scrubber, or other vessel or vessels, into which impure coal gas is passed after being treated as follows:—The impure coal gas is passed through vessels called decarbonating vessels, containing an alkaline substance or substances, such as lime, soda, potash, ammonia, or the ammoniacal solution called gas liquor, for such time and in such manner as that the carbonic acid contained in the impure coal gas shall, from its greater affinity for those alkaline substances, have expelled sulphuretted hydrogen (likewise contained in the impure gas) from the vessels, taking its place and driving it—namely, sulphuretted hydrogen—forward with the coal gas into the vessel or vessels containing the solution of potash, to be sulphuretted, whereby the solution is converted into sulphides of potassium. As soon as the coal gas issuing from the decarbonating vessels contains carbonic acid, the contents of one or more of them are to be changed, and the vessels recharged with any of the before-mentioned alkaline substances or mixtures thereof, so as to arrest the carbonic acid, and whenever or soon after the coal gas issuing from the vessels containing the solution of potash to be sulphuretted contains sulphuretted hydrogen, the process of producing sulphides of potassium in these vessels is completed.

2. *Production of Sulphides of Ammonium.*—The ammoniacal solution called gas liquor is first decarbonated—that is to say, it is treated with lime or with other suitable alkaline substances in a manner well understood, in order to eliminate the carbonic acid contained in the gas liquor. Thereafter the liquor, which is now a weakly sulphuretted solution of ammonia, is employed in a washer or scrubber or other vessel or vessels, and treated by the process described relative to the production of sulphides of potassium.

3. *The Sulphuretting of Ordinary Gas Liquor.*—Gas liquor in its ordinary condition is obtained or employed in a washer or scrubber or other vessel or vessels, and treated in the manner above described relative to the production of sulphides of potassium and of sulphides of ammonium, whereby the liquor in the vessels is sulphuretted more conveniently and economically than if sulphur in a solid form were mixed and combined with the gas liquor.

Having thus produced the alkaline sulphides, including the more highly sulphuretted gas liquor, by the process described, whereby carbonic acid and sulphuretted hydrogen are by one and the same process eliminated from coal gas, it is proposed to employ them for the purpose of purifying coal gas from the sulphur existing in the gas as bisulphide of carbon or in other forms than that of sulphuretted hydrogen.

One manner or method is as follows:—After purifying coal gas from sulphuretted hydrogen by oxide of iron purifiers in the ordinary manner, the gas is passed through vessels containing lime, or through washers or scrubbers or other vessels containing a solution of one or more of the alkaline substances already mentioned, so as to eliminate the carbonic acid, and thereafter the gas is passed through a vessel or vessels containing sulphides of potassium or sulphides of ammonium, including the more highly sulphuretted gas liquor described in section 1 (3). Or the purification of coal gas first from carbonic acid and thereafter from sulphur (*i.e.*, sulphuretted hydrogen and the other sulphur compounds) may be more conveniently and economically effected by the employment of alkaline washers or scrubbers or other vessels as follows:—A solution of potash or decarbonated gas liquor, or gas liquor in its ordinary condition, is employed in a series of washers or scrubbers or other vessels, in the employment of which vessels the process already described is applied, whereby the carbonic acid is eliminated from the coal gas in the first vessel or vessels of the series, while the sulphur in the gas is eliminated in the subsequent vessels of the series.

For convenience and economy it is preferred to employ ordinary gas liquor for this purpose in the following manner, but the process is the same if a solution of potash or decarbonated gas liquor be employed. The impure coal gas is passed through a series of vessels in which gas liquor is formed or obtained in the ordinary process of gas purification (*i.e.*, in condensers and washers or scrubbers) in the following manner:—The impure coal gas is passed through the first vessel or vessels of the series for such time and in such manner (previously described) as that the carbonic acid is arrested by the gas liquor, while sulphuretted hydrogen passing forward with the coal gas is arrested in the subsequent vessels of the series, converting their contents into sulphides of ammonium, which is an efficient material for eliminating from coal gas the sulphur existing therein as bisulphide of carbon or in other forms than that of sulphuretted hydrogen. In this process the gas liquor is employed in the first vessel or vessels of the series for such time and in such manner as that the carbonic acid contained in the coal gas shall from its great affinity for ammonia be absorbed by the gas liquor in those vessels, while the sulphuretted hydrogen expelled therefrom by the carbonic acid, or otherwise passing forward with the coal gas, sulphurets or converts into sulphides of ammonium the liquor contained in the subsequent vessel or vessels of the series.

The process of working this last series of alkaline washers or scrubbers and other vessels upon the principle or system described will vary to some extent according to the number of vessels employed, and also according to the relative proportions in which ammonia and carbonic acid and sulphuretted hydrogen exist in the gas which is to be purified. If (as is usually the case) the quantity of ammonia existing in the coal gas be not sufficient to absorb the whole of the carbonic acid, and also thereafter to absorb the sulphuretted hydrogen, in so doing producing sulphides of ammonium in the latter vessels of the series, and if it be necessary or desirable to increase the quantity or alkaline strength of the liquor employed in the series of vessels; decarbonated gas liquor is employed in one or more of these vessels; that is to say, a portion of the gas liquor which has done its work, and has thereafter been decarbonated, is employed in addition to the gas liquor produced in the ordinary course of gas manufacture or purification, in order to produce the results mentioned.

Instead of decarbonated gas liquor, a solution of caustic soda may be employed in one or more of the above-mentioned vessels. In this case it is more economical to employ the soda exclusively in the last vessels of the series, separate from or with as little admixture of ammonia as is possible, for the following reason:—Soda not being volatile, a solution of soda employed in the manner described can be repeatedly revivified (that is to say) freed from the carbonic acid and the sulphuretted hydrogen absorbed by it, and thereafter be re-employed in the washers or scrubbers or other vessels, whereas decarbonated gas liquor (owing to the volatile nature of the ammonia contained therein) cannot be revivified so economically.

Note.—By the process just described the purification of coal gas is effected in a manner which the inventor believes to be more economical and not less efficient than any which has hitherto been proposed—viz., by employing solely or chiefly substances contained as impurities in the gas itself. Under the present system of absorbing ammonia from coal gas in the condensers and in washers or scrubbers, the coal gas issuing from those vessels or from the last of the series contains a large amount of carbonic acid and sulphuretted hydrogen, the carbonic acid being in much larger quantity than the sulphuretted hydrogen; but by turning to practical account the greater affinity which carbonic acid has for ammonia than sulphuretted hydrogen has in the manner already described, and also if necessary by increasing the quantity or alkaline strength of the liquor contained in the washers or scrubbers or other vessels by the employment of gas liquor which has been decarbonated, or a solution of soda, the whole of the carbonic acid can be eliminated in the first vessel or vessels of the series, while the sulphuretted hydrogen passing forward is absorbed in the subsequent vessels of the series, at the same time producing in these latter vessels sulphides of ammonium (or sulphides of ammonium and of sodium together) which is an efficient material for purifying the gas from the sulphur existing therein as bisulphide of carbon, or in other forms than that of sulphuretted hydrogen.

APPLICATIONS FOR LETTERS PATENT.

3383.—Quick, J., jun., and Restler, J. W., Great George Street, "Improvements in apparatus for measuring the passage of water and other liquids, also for pumping purposes." Oct. 18, 1873.

3392.—Ambler, W., and Gawthorp, W., Bradford, Yorkshire, "Improvements in taps and valves." Oct. 20, 1873.

3426.—Medlen, R. W., Stoke Newington Green, Middlesex, "Obtaining from petroleum, paraffin, or coal oil an improved quality of light for preventing smoke and smell, and for economizing the oil." Oct. 22, 1873.

3430.—Wilkinson, S., Sheffield, "An improved arrangement for relieving the pressure in gas-retorts." Oct. 22, 1873.

3441.—Seegers, L., Berners Street, Oxford Street, "Improvements in the construction and arrangement of apparatus for economizing the consumption and increasing the illuminating and heating powers of coal gas, water gas, and other inflammable vapours and gases, and mixtures thereof." Oct. 23, 1873.

3457.—Weems, W., Johnstone, N.B., "Improvements in apparatus or means for lighting and ventilating." Oct. 24, 1873.

3459.—Smith, T. J., Fleet Street, London, "Improved means of and appliances for facilitating the lighting of gas-jets." A communication. Oct. 24, 1873.

3478.—Worth, R. J., Stockton-on-Tees, "Improvements in steam-pumps." Oct. 27, 1873.

3487.—Haseltine, G., Southampton Buildings, London, "An improved motive-power engine to be operated by the pressure of water, steam, or compressed air, and capable of use as a pump, blowing-engine, or gas-exhauster." A communication. Oct. 27, 1873.
3490.—Bray, H., Manchester, "Improvements in the manufacture of gas for illuminating and heating purposes." Oct. 27, 1873.
3526.—Harrison, C. W., High Holborn, "Improvements in the manufacture of gas, and in the apparatus employed therein." Oct. 30, 1873.
3528.—Bower, G., and Bower, A. S., St. Neots, Hunts, "Improvements in rotatory steam-engines and in governors, which improvements are partly applicable to pumps and gas-exhausters." Oct. 30, 1873.
3541.—Milnes, J. F., Park Valley, Notts, "Improvements in apparatus for utilizing sewage." Oct. 31, 1873.
3549.—Rooke, A., Millwall, Middlesex, "Improved means of and apparatus for 'stopping' tubes." Oct. 31, 1873.
3554.—Sweet, A., Hampstead Road, Middlesex, "Improved mechanical arrangements for water supply purposes, whereby waste is prevented, regulation effected, and 'bremor' avoided." Nov. 1, 1873.
3555.—Gercke, K. L. H., Berlin, "Improvements in apparatus for regulating the flow of gas or other fluids." A communication. Nov. 1, 1873.
3607.—Soul, M. A., Leadenhall Street, London, "Improvements in self-lighting gas apparatus." A communication. Nov. 6, 1873.
3610.—Gurney, J., Bradford, "Improvements in the construction of taps or valves." Nov. 6, 1873.

GRANTS OF PROVISIONAL PROTECTION.

3227.—Ritchie, C., Brixton, Surrey, "Improvements in apparatus for utilizing heat for heating, cooking, ventilating, and lighting." Oct. 4, 1873.
3240.—Clark, A. M., Chancery Lane, "An improved regulator for gas and other fluids." A communication. Oct. 6, 1873.
3243.—Blake, E. O., Leadenhall Street, London, "Improvements in apparatus for carburetting and supplying carburetted air for lighting and heating purposes." A communication. Oct. 6, 1873.
3264.—Gardner, H., Holloway, Middlesex, "Improvements in treating air for the production of hydrocarbon gas, and in apparatus or appliances therefor." A communication. Oct. 8, 1873.
3269.—Blacker, D., Thornhill Lees, near Wakefield, "Improved means or method of and apparatus for condensing and for attracting and absorbing the noxious gases arising from the combustion of coal gas used in connexion with blast-furnaces." Oct. 9, 1873.
3291.—Silber, A. M., Whitecross Street, London, and Farquhar, J. F. C., Long Acre, Middlesex, "Improvements in the construction of lamps and lanterns or similar apparatus used for lighting purposes, and in apparatus for heating purposes." Oct. 10, 1873.
3305.—Bamber, W., Openshaw, near Manchester, "An improved gas-burner to be employed for gassing yarn." Oct. 11, 1873.
3308.—Newton, H. E., Chancery Lane, "An improved mode of connecting gas, water, or other pipes." A communication. Oct. 11, 1873.
3314.—Manwell, J., Glasgow, "Improvements in charging horizontal retorts, and in apparatus therefor." Oct. 13, 1873.
3319.—Muir, J. S., Leeds, "Improvements in the manufacture of gas." Oct. 14, 1873.
3325.—Black, T., Liverpool, "Improvements in appliances for cleaning, scaling, and stopping tubes." Oct. 14, 1873.
3327.—Surmon, H. J., Belvedere, Kent, "Improvements in apparatus for manufacturing gas." Oct. 14, 1873.
3343.—Lake, W. R., Southampton Buildings, London, "Improvements in double-acting lift and force pumps." A communication. Oct. 15, 1873.
3353.—Clark, A. M., Chancery Lane, "Improvements in the manufacture of artificial fuel, and in the production of gas for illuminating and heating purposes." A communication. Oct. 16, 1873.
3372.—Belt, A., New Cross, Kent, "Improvements in safety gas-burners." Oct. 16, 1873.
3383.—Quick, J., jun., and Restler, J. W., Great George Street, "Improvements in apparatus for measuring the passage of water and other liquids, also for pumping purposes." Oct. 18, 1873.
3319.—Muir, J. S., Leeds, "Improvements in the manufacture of gas." Oct. 14, 1873.
3392.—Ambler, W., and Gawthorpe, W., Bradford, Yorkshire, "Improvements in taps and valves." Oct. 20, 1873.
3430.—Wilkinson, S., Sheffield, "An improved arrangement for relieving the pressure in gas-retorts." Oct. 22, 1873.
3445.—Robertson, J., Nitshill, N.B., "Improvements in compressing air for burning in combination or mixture with gas or inflammable vapour in apparatus for finishing textile or other fabrics, or in other apparatus where heat is required, and in the means employed therefor." Oct. 23, 1873.
3459.—Smith, T. J., Fleet Street, London, "Improved means of and appliances for facilitating the lighting of gas-jets." A communication. Oct. 24, 1873.
3478.—Worth, R. J., Stockton-on-Tees, "Improvements in steam-pumps." Oct. 27, 1873.

INVENTIONS PROTECTED FOR SIX MONTHS ON THE DEPOSIT OF COMPLETE SPECIFICATIONS.

3441.—Seegers, L., Berners Street, Oxford Street, "Improvements in the construction and arrangement of apparatus for economizing the consumption and increasing the illuminating and heating powers of coal gas, water gas, and other inflammable vapours and gases, and mixtures thereof." Oct. 23, 1873.
3487.—Haseltine, G., Southampton Buildings, London, "An improved motive-power engine to be operated by the pressure of water, steam, or compressed air, and capable of use as a pump, blowing-engine, or gas-exhauster." A communication. Oct. 27, 1873.

NOTICES TO PROCEED.

2174.—Loutitt, K. M'L. P., Greenwich, "Improvements in the manufacture of gas for heating and lighting purposes, and in the apparatus employed therefor." June 21, 1873.
2214.—Ross, O. C. D., Craven Street, Strand, "Improvements in the production of vaporized air for heating purposes generally, and in means for regulating and controlling the admixture of vaporized and other air when employed for such purposes." June 25, 1873.
2259.—Henderson, A. C., Southampton Buildings, Holborn, "Improvements in water, liquid, gas, and steam gauges." A communication. June 30, 1873.
2404.—Robinson, J., West Bromwich, "Improvements in machinery or apparatus for charging and discharging retorts, ovens, and furnaces." July 12, 1873.
2731.—Warren, W., Cheltenham, "Improvements in and applicable to pumps." Aug. 22, 1873.
2791.—Goodall, R., Armley, near Leeds, "Improved means or method of treating and clarifying sewage or other impure waters." Aug. 23, 1873.
2954.—Wilson, A. F., Buckingham Street, Adelphi, "Improvements in apparatus used in the manufacture of gas, and in the production of some of its constituents." Sept. 8, 1873.
3119.—Michel, C., and Frager, A., Paris, "An improved water-meter or apparatus for measuring the flow of liquids." Sept. 23, 1873.
3138.—Beale, J., East Greenwich, "An improved engine to be used for pumping gases, air, or fluids." Sept. 26, 1873.
3175.—Fischer, J., Ulm, Wurtemburg, "An improved construction of meter for measuring water and other liquid bodies." Sept. 30, 1873.
3185.—Voizat, F. G., Kentish Town, Middlesex, "Improvements in apparatus used in the production of gas from hydrocarbon liquids." Oct. 1, 1873.
3224.—West, J., Maidstone, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.
3225.—West, J., Maidstone, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.

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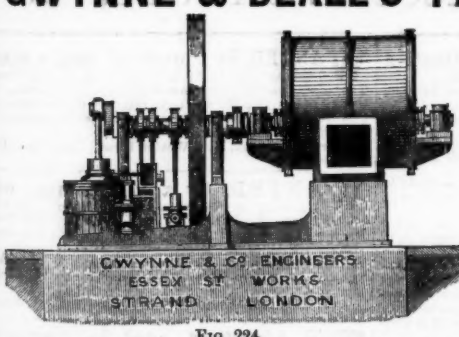

Fig. 224.

The BEST EXHAUSTERS IN THE WORLD.

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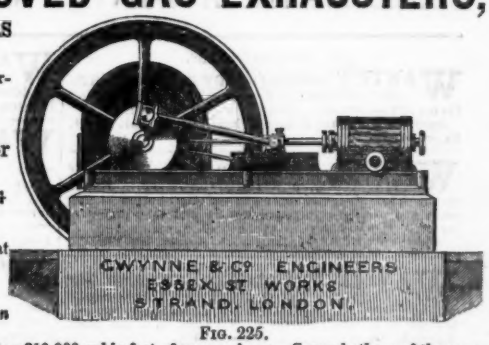

Fig. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. Gwynne and Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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The superior quality of this well-known Cannel, as wrought by

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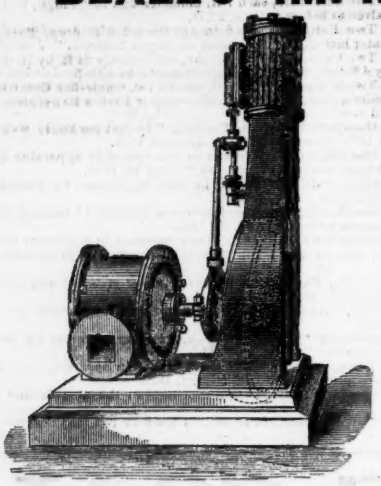

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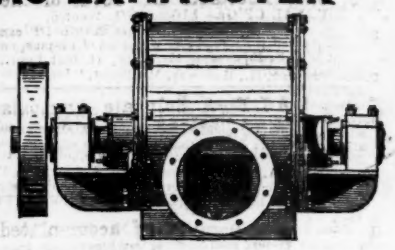

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MR. HEDLEY, C.E., may be Consulted upon all matters connected with Gas, Water, and Sanitary Improvements. He is specially prepared to undertake Parliamentary, Legal, and Rating Cases, and to act as Arbitrator or Referee.
Mr. HEDLEY has devoted great attention to the vexed question of the Supply of Gas to Street Lamps, and refers to his Evidence given before Parliament upon the Birmingham, Nottingham, Metropolis, City of London, Luton, and other Gas Bills.
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WANTED, by a young man, a situation as Meter Fixer, Fitter, Service Layer, &c.
Address A. B., care of Mr. Lenz, 4, Windsor Terrace, Beckton Gas-Works, near NORTH WOOLWICH.

WANTED, a Meter Inspector. Appli- cants must have a knowledge of both gas and water meters.
Applications, stating age and references, to be made to Mr. T. A. DREW, Engineer, &c., Gas and Water Works, WIDNES.

DUBLIN ALLIANCE & CONSUMERS GAS COMPANY.

WANTED, a resident Engineer for the above Company. The requisite qualifications are a thorough practical knowledge of engineering, the manufacture and distribution of gas, setting of retorts, and construction of works. Salary £300 per annum, with a good residence.
Applications, addressed to the CHAIRMAN, to state age, &c., and endorsed "Engineer," to be forwarded to the above address on or before the 24th inst."
Nov. 14, 1873.

COOKING AND HEATING BY GAS,
BY
MAGNUS OHREN, A.I.C.E.

GAS *versus* COAL.

Pamphlet for Gas Companies to circulate amongst their gas consumers to increase day consumption, &c.

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WANTED, by a practical man, a situa- tion as MANAGER or FOREMAN of a Gas-Work. Thoroughly understands the manufacture, distribution, and testing of gas, also the setting of retorts with the introduction of hot air. Good references and testimonials as to character and abilities.
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WANTED, by a young man, who thoroughly understands the management of Gas-Works, keeping of accounts, &c., having for five years successfully managed a small Gas-Work, and had seven years experience in larger works, an engagement as MANAGER of a Gas-Work, where the annual make is 12 millions or above. Excellent references for character, ability, &c.
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THE Advertiser, aged 25, desires an engagement as Assistant Manager, Yard Foreman, Collector, &c. Thoroughly understands the manufacture of gas in all its details. Good references and security.
Address C. E. B., 60, Stafford Place, Buckingham Gate, LONDON, S.W.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBU- TION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.
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WANTED, a Manager, who speaks and writes Italian fluently, to take charge of the Gas-Works of a town in Italy, having a population of 20,000 inhabitants.

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WANTED, a Station-Meter (second hand), to pass 6000 cubic feet per hour; also Two Purifiers, about 6 ft. by 6 ft. by 2 ft. 8 in.

Send particulars, with price, to A. C. FRASER, Gas Engineer, Barnet, Herts.

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Any person having a clean copy to DISPOSE OF can obtain the marked price, together with cost of postage, on sending it to C. S. E., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Sulphate Ammonia CHAMBER and DRAINER (made by Nelson, of Bolton). As good as new.

May be seen, and particulars obtained, on application to the undersigned,

Gas-Works, Lancaster. WM. FLEMING.

NOTICE.

A SALE, by Auction, of accumulated Surplus Stores, consisting of machinery, old iron, building materials, gas and water fittings, &c., will take place on the Premises, near the station (main line), Barnet, on Tuesday, the 2nd of December, 1873, by Mr. Frederic Venables, at Twelve o'clock.

By order of the Board of Directors,

W. C. HUMPHRYS, Secretary.

Barnet District Gas and Water Company,

Nov. 14, 1873.

N.B.—Catalogues forwarded on application.

THE Steam Stoker Company, Limited, invite TENDERS for the construction and erection of FOUR STEAM STOKING MACHINES for the Imperial Gaslight and Coke Company, London, and TWO MACHINES for the Gas-Works of the Salford Corporation.

The drawings and specifications can be seen on and after the 10th inst., at the Offices of the Steam Stoker Company, 155, Fenchurch Street, and for the Salford Machines also at the Corporation Gas Office, Lamb Lane, Salford.

Tenders are to be sent on or before the 24th inst., sealed and endorsed "Tenders for Imperial Machines," "Tenders for Salford Machines," and addressed to the Secretary, at 155, Fenchurch Street, London.

The Directors do not bind themselves to accept the lowest or any tender.

By order,

WILLIAM GIBSON, Secretary.

155, Fenchurch Street, London, Nov. 3, 1873.

THE NEW GAS COMPANY, LIMITED.

THE Directors of the above Company are ready to receive APPLICATIONS from owners of existing Gas-Works, as well as from others erecting or about to erect new works, and to grant Licences for the use of the Patents.

Apply to the SECRETARY, 22, WALBROOK, E.C.

AMMONIACAL LIQUOR.

THE Directors of the Independent Gas-light and Coke Company are prepared to receive TENDERS for the whole of the AMMONIACAL LIQUOR produced at their works at Haggerston, to commence on the 1st of January, 1874.

All particulars may be obtained on application to Mr. Laing, the Engineer, on the works.

Tenders, stating price and terms of contract, to be sent in to me, on or before Friday, the 5th of December, endorsed "Tender for Ammoniacal Liquor."

By order,

JAMES B. COULSON, Secretary.

236, Kingsland Road, Nov. 10, 1873.

ROCHDALE CORPORATION.

TO FIRE-BRICK AND RETORT MAKERS AND OTHERS.

THE Gas Committee invite Tenders for the supply of the following goods, in quantities as required by them, from the 1st of December, 1873, to the 31st of October, 1874—viz.:

Clay Retorts.
Fire-Bricks and Blocks.
Fire-Clay.
Gas-Meters.
Service-Pipes and Fittings.

Further particulars and forms of tender may be obtained from Mr. Samuel Hunter, at the works.

Tenders must be sent to my Office on or before the 25th of November inst., endorsed "Tenders for Retorts, &c."

By order, ZACH. MELLOR, Town-Clerk.

Town-Hall, Rochdale, Nov. 4, 1873.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

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LIMITED,
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SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
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Castings for Gas-Works of every description.
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PATENT PLATINUM
GASLIGHT PERFECTER.

Extract from Report by Dr. Letheby:—

"The results have been very remarkable, for they show an average increase of 63 per cent. on the illuminating power of the gas. I am of opinion, therefore, that the invention is of great practical value."

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"Scholl's Platinum Perfecter is one of the most important inventions of modern times in connexion with the burning of coal gas."

Price 1s. each for Fishtail Burners.

To be had retail of Gas-Fitters and Ironmongers.

JOHN SCHOLL, Manufactory: 41 & 42, BERWICK STREET;
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Terms on application. N.B.—A specimen sent free on receipt of Twelve stamps.

*** Further testimonials from Drs. Frankland and Crooks, showing the great practical value of this invention, will be shortly published.

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MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.
STEAM-ENGINES and EXHAUSTERS, separately or combined.
FOUR-WAY VALVES, one of which is equal to three ordinary Valves.
STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

IMPERIAL GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that an EXTRAORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Office of the Company, No. 33, John Street, Bedford Row, London, on FRIDAY, the 21st of November inst., at One o'clock precisely, for the purpose of creating and authorizing the issue of a further portion of the additional share capital, which the Company have power to raise, under the Imperial Gas Act, 1869, to the extent of £325,000, upon such terms and conditions as shall be resolved upon.

By order,

HARRY CHUBB, Secretary.

Offices of the Company, Nos. 33, & 34, John Street, Bedford Row, London, Nov. 1, 1873.

THE Scarborough Gas Company, owing to the removal of their works, will have FOR SALE, about October, 1874, the following APPARATUS, the whole of which is in exceedingly good condition:—

Fittings for 140 Retorts, consisting of mouthpieces, ascension, saddle, and dip pipes, and hydraulic and foul mains.

A Condenser, consisting of 40 12-in. pipes, with top and bottom boxes, and inlet, outlet, and bye-pass valves.

Two Scrubbers, each 7 ft. diameter and 16 ft. high, with valves as before.

Two Purifiers, 8 ft. 6 in. square and 4 ft. deep, 20-in. water lutes.

Two Cast-iron Water-Tanks, respectively 24 ft. by 16 ft. by 4 ft., and 20 ft. by 8 ft. by 4 ft. New in 1865.

Two Horizontal Engines, 4 h. p., two single-flue Cornish boilers, and two 20,000 feet per hour Beale's Exhausters. All new in 1866.

One Station-Meter, by Milne, 20,000 feet per hour. New in 1864.

One Gasholder 80 ft. diameter, in two 24-ft. lifts. About 11 years old.

One Gasholder 50 ft. diameter, in two 22-ft. lifts. Only 4 years old.

Two Governors, by Parkinson, on 12-in. and 10-in. mains.

A considerable length of 10-in. Cast-iron Socket and other Pipes.

An inspection of the above Apparatus is requested by the Officers of Companies requiring enlargements or extensions, and offers to purchase will be duly considered.

By order of the Board,

JAMES MOON,
Manager and Secretary to the Company.

LIGHTING STREET-LAMPS.

NOTICE is hereby given that the General Purposes Committee of the Vestry of the Parish of St. Pancras are prepared to receive TENDERS for the under-mentioned works required for the adoption of the system of Average Meter Indication to the Lighting of the Public Street-Lamps.

1. For the supply of 280 (or thereabouts) meters and meter-boxes. The meters to be compensating wet meters, cased in cast iron, of a capacity to pass 18 cubic feet of gas per hour, and with a drum of a radius equal to that of an ordinary 5-light meter. The boxes to be of cast iron, and made water-tight by proper lids. The boxes and meters to be let into the ground near the lamp-columns, and all necessary connexions to be made to the mains and lamps.

2. For the examination and testing of the meters and repairs to meters and meter-boxes for two or more years, not exceeding ten, to be stated by the parties tendering.

3. For the supply and fixing of 3336 (or thereabouts) burners and governors, and for the annual examination, testing, and repairs required to the same, for a period to be named, as above, by the parties tendering.

4. For the painting once in every year, and keeping in repair, 3336 (or thereabouts) lamp-columns, head irons, and lanterns, the periodical cleaning of the lanterns, and the lighting and extinguishing of the lamps, for a period to be named, as above, by the parties tendering.

Persons desiring to contract with the Vestry may send in tenders for the several works under any or all of the four heads above mentioned. Each tender must be accompanied with a model or sample of the meter, meter-box, burner, and governor intended to be supplied.

Any further particulars may be had, and a copy of the specification may be seen, at the Vestry Hall.

The Vestry do not bind themselves to accept the lowest or any tender.

No tender will be considered unless good security be proposed therein for the due performance of the contract, and unless £20, in Bank of England notes, be enclosed therewith as evidence that the tender is made in good faith.

The money to be returned immediately to the parties whose tenders are not accepted, and to the others so soon as the bond and contract for the work has been duly signed, or to be forfeited in the event of any neglect or refusal to sign the bond and contract.

Tenders to be sent in not later than Tuesday, the 25th inst., at 4 p.m.

By order,

THOS. ECCLESTON GIBB, Vestry Clerk.

Vestry Hall, Pancras Road,
Nov. 8, 1873.

Now ready, price 1s. 6d., post free,

THE GAS CONSUMER'S MANUAL;
OR,
How to obtain Good Light and Cheap Gas.

Being a Popular Exposition of the Chemistry of Gas Lighting, with Practical Instructions in the best methods of burning Gas for Lighting, Cooking, and Heating; and Suggestions as to the proper Sizes of Interior Pipes, Arrangement of Lights, &c., &c.

ILLUSTRATED.

Also, price 2s. 6d., post free,

ON SETTING AND WORKING RETORTS.

A Revised and Illustrated Reprint of a Paper read at the Annual Meeting of the British Association of Gas Managers in 1870.

By E. S. CATHELS, Assoc. Inst. C.E., Montreal, Canada.

London:

WILLIAM B. KING, 11, Bolt Court, Fleet Street, E.C.

CLAYTON'S PATENT SIX-WAY VALVE only requires one valve to work two purifiers; saves more than three-fourths of the connexion-pipes; requires neither tees, elbows, nor bends; no racks or springs to get out of order.

For particulars, apply to CLAYTON, SON, & Co., Gas Engineers, Hunslet, LEEDS.

GAS PURIFICATION.

JOHN WM. O'NEILL AND CO.,

CONTRACTORS FOR

GAS PURIFICATION BY OXIDE OF IRON,

39, LOMBARD STREET, LONDON, E.C.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

JOSEPH AIRD,

WELLINGTON TUBE-WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

PATENT WELDED WROUGHT-IRON GAS, STEAM, HYDRAULIC, GALVANIZED, & ENAMELLED TUBES & FITTINGS.

WILLEY AND FORD,

GAS ENGINEERS,

WORKS: COMMERCIAL ROAD, EXETER,

INVITE THE ATTENTION OF GAS COMPANIES AND OTHERS FOR THE SUPPLY OF

EVERY DESCRIPTION OF GAS APPARATUS.

ENGINEERING DEPARTMENT.

NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

GASHOLDERS AND TANKS.

RETORTS and RETORT-HOUSE FITTINGS, CONDENSERS, SCRUBBERS, ENGINES and EXHAUSTERS, PURIFIERS, STATION-METERS, GOVERNORS, VALVES, &c.

METER DEPARTMENT.

They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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PATENT WELDED WROUGHT-IRON TUBES,

FOR GAS, STEAM, AND WATER;

GAS-FITTERS TOOLS, STEAM COCKS, AND ALL KINDS OF JOINTS.

HYDRAULIC TUBES, CORE BARS, TELEGRAPH POSTS, COILS, &c.

London Agent—ALFRED LAKEMAN, 18, IRONMONGER LANE, CHEAPSIDE, E.C.

THE ECONOMIC GAS-RANGE & ROASTER COMPANY,

TABLE ROASTER.

SMALL RANGE. LARGE RANGE. ROASTERS, Nos. 1, 2, & 3.

ON SOUTHBY'S PATENT, WHICH SECURES PERFECT VENTILATION.

A 7-lb. JOINT ROASTED TO PERFECTION FOR ONE HALFPENNY.

SELECTED BY THE COMMISSIONERS FOR THE ANNUAL INTERNATIONAL EXHIBITIONS, 1871 & 1873.

A pennyworth of gas, perfectly consumed and economized as it is under this Patent, does as much work as six pennyworth of coal. The peculiar arrangement of cannel fishtails in a chimney secures freedom from smoke even with the richest gas, and a positive immunity from every trace of smell. The simplicity in use is so great that no experience is required. Roasters from 10s. 6d. to £1 5s. Complete Ranges at £2 for small families; £3 10s. for ordinary establishments; and £6 for a Range equal in power to a large Kitchener. Estimates given for fitting up Hotels, Restaurants, and large Establishments.

Works: 2, BASSETT STREET, MALDON ROAD, KENTISH TOWN, N.W.,

Where the Apparatus can be seen in operation;

And at Mr. WOODCOCK'S Offices, 23, ABINGDON STREET, WESTMINSTER, where Mr. SOUTHBY can be consulted by appointment.

VICKARYS AND ROBERTSON,

Late JOHN VICKARY,

ESTABLISHED 1840,

GAS ENGINEERS, CONTRACTORS, IRON AND BRASS FOUNDERS,

WEST OF ENGLAND ENGINEERING WORKS, EXETER.

GASHOLDERS AND TANKS,

Retorts, Retort-Fittings, Condensers, Scrubbers, Purifiers, Station-Meters, Governors, Rack and Screw Valves. Gas and Water Mains always in Stock.

STEAM-ENGINES, EXHAUSTERS, SHAFTING AND GEARING, &c.

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Including Chandeliers, Pendants, Hall Lamps, Brackets, Star and Sun Lights of all designs.

WET & DRY GAS-METERS,

Combining most recent improvements in principle and manufacture; upwards of 200,000 already in work, giving highest satisfaction.
(A guarantee of five years given with every Meter.)

PLUMBERS WORK, including Lift and Force Pumps; Cocks for Gas and Water and Steam; Brass Fittings.

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LIME SUPERSEDED

IN THE

PURIFICATION OF ILLUMINATING GAS,

BY

Spence's Patent Dry Copperas,

The only Purifying Material which removes, by one process, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of four years at some of the largest Gas-Works in the Kingdom.

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VICTORIA CHEMICAL WORKS, ASHTON NEW ROAD, BRADFORD, MANCHESTER,

Manufacturers of SPENCE'S PATENT DRY COPPERAS; GREEN COPPERAS;

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ALL COMMUNICATIONS TO BE ADDRESSED TO THE WORKS.

WILLIAM & BENJAMIN COWAN,

ESTABLISHED 1827,

KING HENRY'S WALK,
BALLS POND ROAD,
(NEAR DALSTON JUNCTION STATION,) **LONDON, N.**

BUCCLEUCH ST. WORKS,
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Manufacturers of DRY GAS-METERS in TIN AND CAST-IRON CASES.

Sole Manufacturers of ESSON'S PATENT COMPENSATING GAS-METER,

AND OF **COWAN'S PATENT SIDE-VALVE GAS-METER.**

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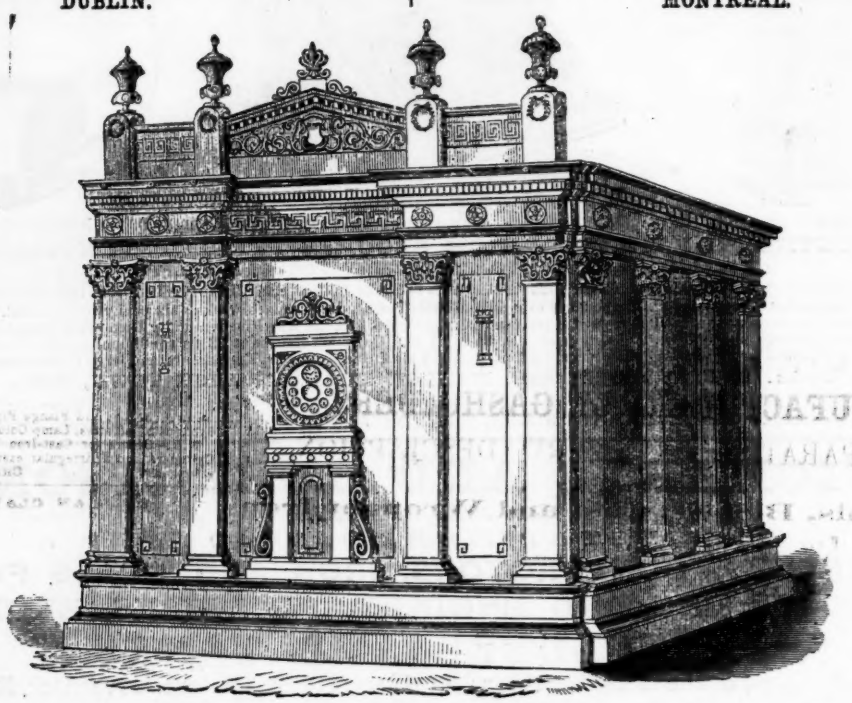
Messrs. J. EDMUNDSON & Co., 36, Capel Street, DUBLIN.

Messrs. R. MITCHELL & Co., Peter Street and Craig Street, MONTREAL.



W. & B. COWAN'S SQUARE STATION-METER with PLANED JOINTS.

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WET AND DRY METERS SPECIALLY MANUFACTURED FOR STREET-LAMPS.

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FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

The F. I. Co. have the exclusive right to make and sell Fraser's Patent "Ribbed" Gas-Retorts in Fire-Clay.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

Apply as above, or to the London Offices, 15, NEW BROAD STREET, E.C.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

JUST PUBLISHED, a revised and illustrated Reprint, with additions, of the Paper on

RETORT SETTING AND WORKING,

READ AT THE

MEETING OF THE BRITISH ASSOCIATION OF GAS MANAGERS IN 1870,

By E. S. CATHELS, Assoc. Inst. C.E.

To be had of Mr. W. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Price 2s. 6d., post free.

"The first paper read was on the 'Setting and Working of Retorts,' by Mr. E. S. Cathels, of the Crystal Palace District Gas-Works. This was an exhaustive, and, to gas managers, an invaluable paper on the apparatus used in one of the most important processes in the manufacture of gas. It is a subject to which the author is well known to have given special attention, and we therefore commend his paper to the careful notice of those of our readers who are interested in the production of gas."—*From a Leading Article in "Engineering," on June 10, 1870.*

RETORT-SETTINGS.

MR. CATHELS

IS PREPARED TO SUPPLY

TRACINGS OF DETAILED WORKING DRAWINGS

OF HIS

IMPROVED RETORT-SETTINGS

(FROM 1 TO 9 RETORTS IN A BED),

ADAPTED FOR EITHER COKE OR TAR AS FUEL,

Showing Plans, Transverse and Longitudinal Sections, and Elevations; easily understood by any retort-setter or bricklayer. These Settings are excellent gas producers, with great economy in fuel.

For terms, &c., apply to E. S. CATHELS, Assoc. Inst. C.E., GAS-WORKS, MONTREAL, CANADA.

"On the proper mode of setting the retorts the prosperity of a gaslight establishment mainly depends."—*Vide Peckstone's Treatise on the "Manufacture of Gas."*

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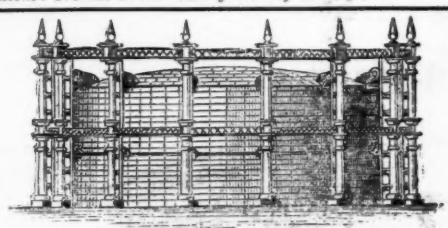

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GAS ENGINEERS & CONTRACTORS,

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GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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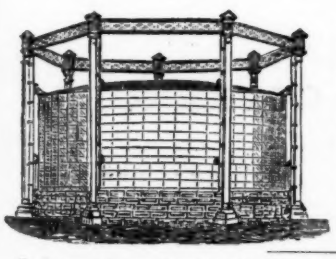
CONTRACTING GAS ENGINEERS,

GASHOLDER & GENERAL GAS APPARATUS MAKERS,

MANUFACTURERS OF

BOILERS, IRON ROOFING, IRON BRIDGES,

AND GENERAL IRONWORK.



S. C. AND SONS undertake Contracts of any magnitude for the **Erection of new and Remodelling of existing Gas-Works**, for **Gasholders, Cast and Wrought Iron Tanks, Iron Roofs**, and every description of **Apparatus** for the Manufacture and Distribution of Gas.

Special attention is invited to their **"Improved Condenser,"** which is very effective, and much approved; also to their patterns of **Annular** and other **Condensers, Scrubbers**, and **Purifiers**, of all sizes, which they arrange either with **Centre** or Ordinary **Slide Valves.**

WORKS FOR THE SUPPLY OF

VILLAGES, MANSIONS, FACTORIES, &c.

S. C. AND SONS undertake the **Supply** and **Laying** of **Mains** for **Gas and Water**, and supply all Castings, Connexions, and Fittings for Retort-House, Works generally, and for Streets. They also supply **Valves** of all descriptions, Iron and Clay Retorts, Hotpressed Retort-Lids, Steel Charging-Scoops of improved make, for which they have special machinery, Improved Coke and Coal Barrows, Cross-Bars and Screws, Bolts and Nuts, Furnace and Stoking Tools, Iron and Wood Purifier-Sieves, Lead, Yarn, Borings, &c., including every requisite whatsoever for a Gas-Work, a well-assorted stock being kept of those goods most in request.

SOLE MAKERS OF BRETT'S PATENT COKE BARROW.

Experienced Retort Setters sent to any part of the Kingdom.

Address: PROVIDENCE IRON-WORKS, MILLWALL, LONDON.

SAMUEL PONTIFEX, Consulting Gas Engineer, having retired from the Great Central Gas Company, is now prepared to furnish PLANS and SPECIFICATIONS, as well as ADVISE Provincial Gas Companies as to the erection of new, or alteration and enlargement of existing works.

Offices: 22, Coleman Street, LONDON, E.C.

MR. WILLIAM DORE (19 years Gas Engineer and Accountant) may be CONSULTED upon all matters relating to the manufacture and distribution of gas, and the management, accounts, or transfer of gas undertakings.

Office, 4, Picton Place, Neath, SOUTH WALES.

MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.

Valuations for Assessment, Transfer, and other purposes.

Offices, MANSION HOUSE CHAMBERS, 12, Queen Victoria Street, LONDON, E.C.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD,

CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

TO GAS COMPANIES.

GEORGE McKAIG,

MANUFACTURER OF

GAS-PURIFYING WOOD SIEVES

153, CLEVELAND STREET,

DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

CELEBRATED HALBEATH STEAM COALS,

on Navy List.

B. CARPENTER'S

IMPROVED WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

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LONDON, N.

The above Sieves are used by all the Gas Companies in London and a great many in the country. Their utility, durability, and cheapness combined, render them superior to all others.

Testimonials from Gas Engineers who have tested their qualities forwarded on application.

All orders punctually attended to, and estimates given if required.

THE IMPERIAL METER COMPANY, LIMITED,

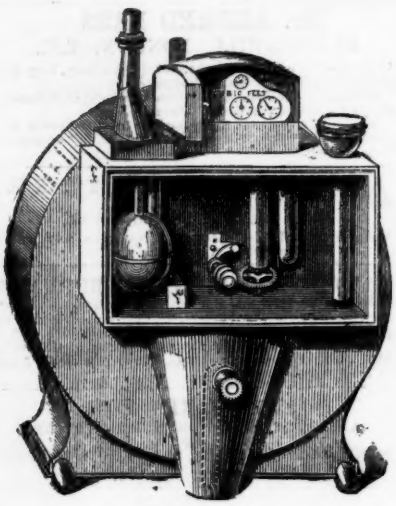
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

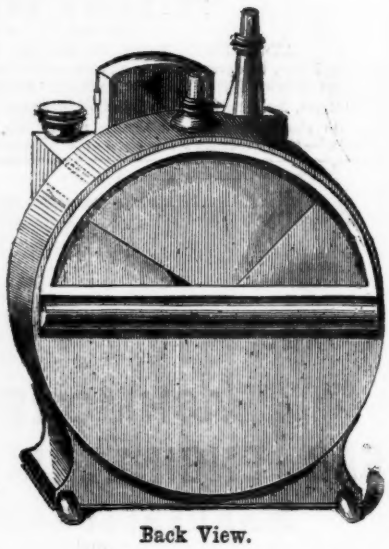
IMPERIAL

COMPENSATING

WET GAS-METER.

DE CASTRO & BURTON'S

PATENT.



Back View.

I. **This Meter is more simple in construction than the common non-compensating Meter.**
II. **An unvarying water-line is maintained.**
III. **No amount or kind of pressure will cause it to "flood."**
IV. **It is practically unaffected by "tilting."**
V. **The friction is less than in any other Meter; and**
VI. **It will last for twelve months without requiring to be refilled.**

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE COMMON NON-COMPENSATING WET GAS-METERS OF ALL SIZES, BOTH IN TIN AND CAST-IRON CASES.

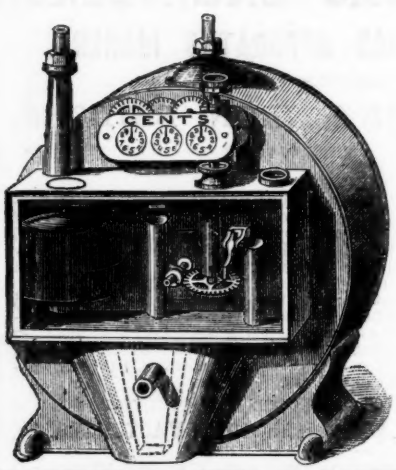
THE COMPENSATING

WET GAS-METER

IS UPHELD FOR

TEN YEARS

WITHOUT CHARGE.



THE IMPERIAL WET GAS-METER.
Non-Compensator.

STATION-METERS

WITH PLANED JOINTS,

AND

GOVERNORS,

MADE TO ORDER

Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

THE IMPERIAL METER COMPANY, LIMITED,

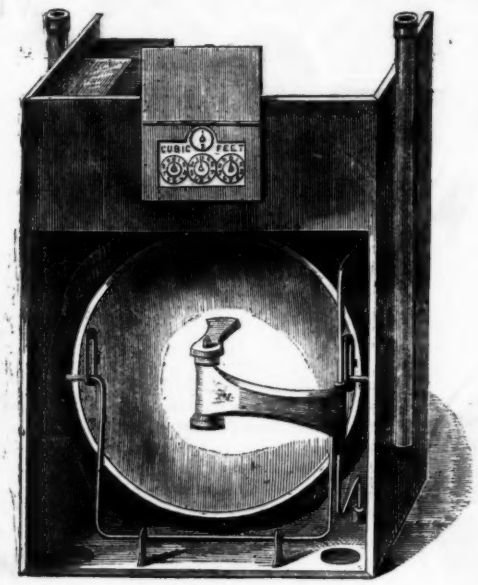
MANUFACTURERS OF

WET AND DRY GAS-METERS,

PRESSURE-GAUGES AND GOVERNORS, AND STREET-LAMP REGULATORS.

FACTORIES:

KING'S ROAD, LONDON, N.W., and GRAY'S INN ROAD, LONDON, W.C.



Front View.

THE

IMPERIAL

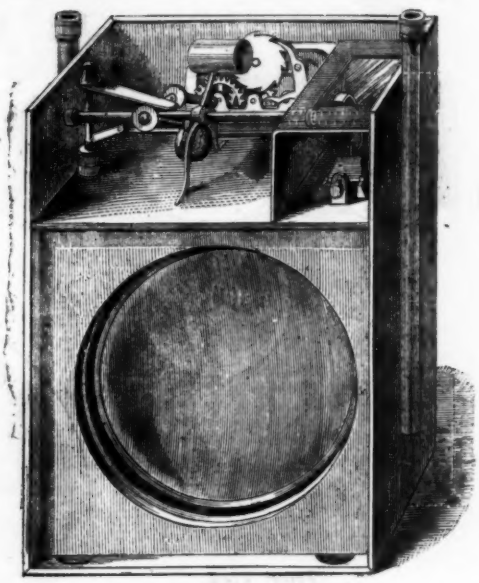
DRY

GAS-METER

SINGLE DIAPHRAGM.

TELLING & JOHNSON'S

PATENT.



Back View.

I. The mechanical construction of this Meter is simpler and stronger than any other.
II. About half as much leather is used as in ordinary dry Meters.
III. The Meter has only one valve, and this cannot "stick."
IV. The lights maintain perfect steadiness and strength of flame. There is no "draw."
V. The gas consumed can only be measured from the inlet to the outlet, and
VI. The index cannot be made to register backwards.

THE IMPERIAL METER COMPANY, LIMITED, ALSO MANUFACTURE ORDINARY DOUBLE DIAPHRAGM DRY GAS-METERS OF ALL SIZES, BOTH IN TIN AND IN CAST-IRON CASES.

SPECIAL ATTENTION

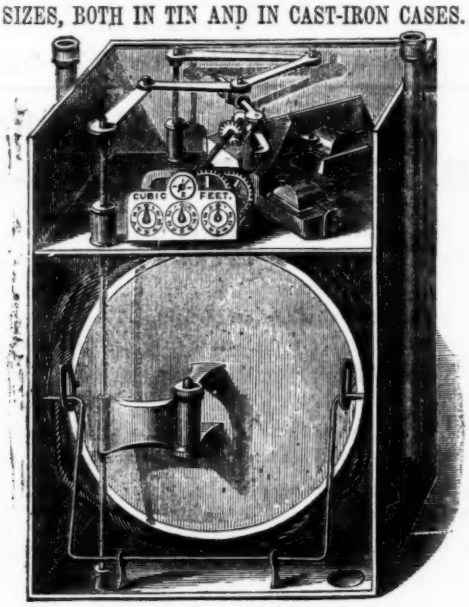
IS PAID TO THE

MANUFACTURE OF

STREET-LAMPS

AND

REGULATORS.



EVERY

DRY GAS-METER

IS UPHELD FOR

SIX YEARS

WITHOUT CHARGE.

THE IMPERIAL DRY GAS-METER.
Double Diaphragm.

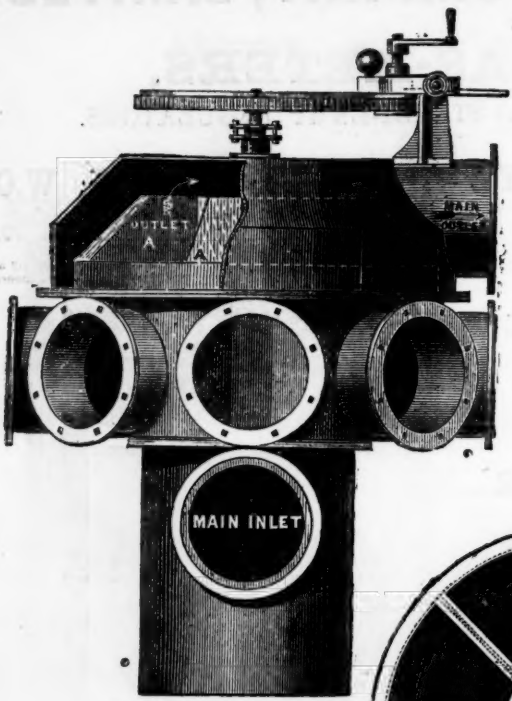
Mr. GEORGE MACKANESS will represent this Company in the Provinces.

OFFICES: 41, FLEET STREET, LONDON, E.C.

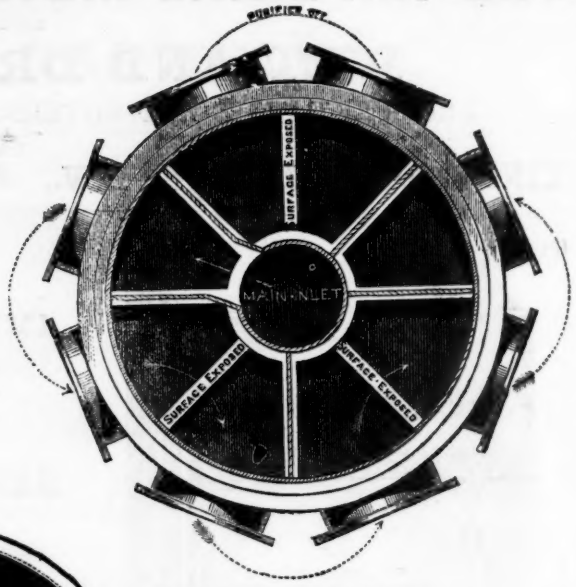
W. MOORE, Secretary.

☞ *All Communications to be addressed to the Secretary.*

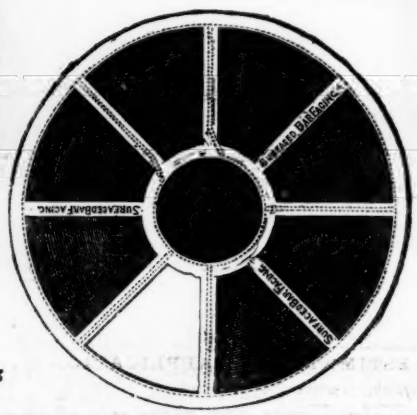
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



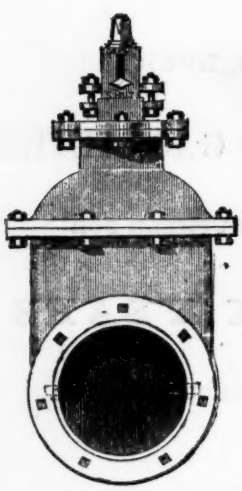
Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



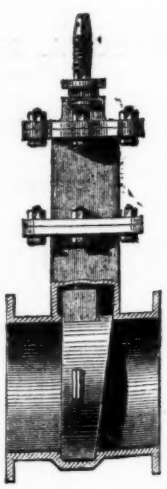
Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.



C. & W. WALKERS'
DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves are superseding the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

GASHOLDERS, TELESCOPE & SINGLE-LIFT, of LARGEST DIMENSIONS.
PURIFIERS, SCRUBBERS, CONDENSERS of most Improved Description.
WOOD SIEVES FOR PURIFIERS,

Which have now been in use for more than ten years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

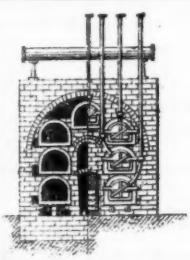
JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

ESTABLISHED 1844.
WHITLEY PARTNERS, LIMITED,
RAILWAY WORKS, LEEDS,
ENGINEERS, FOUNDERS, AND LICENSEES;
MANUFACTURERS OF IMPROVED STEAM-ENGINES, BOILERS, PUMPS, &c.;
MAKERS, BY SPECIAL MACHINERY, OF PATENTED MECHANICAL INVENTIONS,
Comprising numerous Labour-saving Appliances and Economizers of Fuel and Motive Power;
CONTRACTORS TO THE EUROPEAN & COLONIAL GOVERNMENTS & CORPORATIONS;
MERCHANTS AND SHIPPERS OF MACHINERY, METALS, AND HARDWARE;
AWARDED
THE FIRST PRIZE MEDAL AT THE EXPOSITION UNIVERSELLE, PARIS, 1867,
"For Improved Construction, Excellence of Material, and Superior Workmanship;"
TWO GRAND GOLD MEDALS AT THE MOSCOW INTERNATIONAL EXHIBITION, 1872;
ALSO THE FIRST PRIZE MEDALS AT LEEDS AND LYONS IN 1858, 1868, and 1872.
"REDUCTION IN PRICES OF PEET'S VALVES, consequent upon largely increased sales."

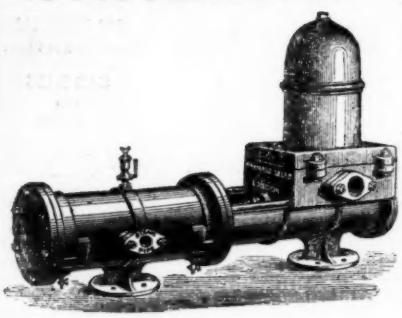
ILLUSTRATED CATALOGUES AND ESTIMATES ON APPLICATION.
Correspondence conducted in English, German, or French.

Samples of Specialties may be inspected at Stand No. 542, Group XIII., in the English Machinery Annexe of the Vienna Exhibition, 1873. For List of same see German Official and "British Section" Catalogues.



HENRY SKOINES,
PATENTEE
AND
CONTRACTING
GAS
ENGINEER,
FOR
SETTING RETORTS,
ERECTING AND REMODELLING GAS-WORKS
Of any extent, at Home or Abroad,
Address, 7, ARGYLE STREET, KING'S CROSS, LONDON, W.C.

THE PATENT
"UNIVERSAL" STEAM PUMP.
SOLE MAKERS,
HAYWARD, TYLER, & CO.,
84 & 85, UPPER WHITECROSS STREET, LONDON, E.C.



IN USE IN SOME OF
THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,
FOR
TAR AND AMMONIACAL LIQUORS.

Ardwick Bridge Chemical Works, Manchester, Oct. 28, 1872.

Sir,—The "Universal" Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily.—Yours truly,
(Signed) PETER HART, *Manager.*

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

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Manufacturers of all sizes of Cast-Iron Main-Pipes by an improved Patent, General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

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NEAR
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SOLE AGENT FOR
EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

INTERNATIONAL EXHIBITION, 1862.
CLASS X.
PRIZE MEDAL
For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,
THROCKLEY,
NEWCASTLE-ON-TYNE.

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WOOD SIEVES.—WOOD SIEVES.
Estimates given and Contracts taken by the Manufacturer
GEORGE MACKANESS,
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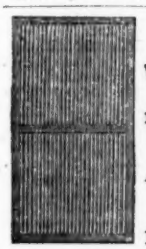
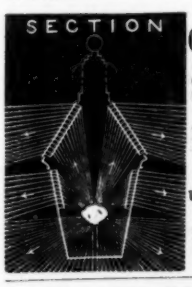
LONDON, N.W.
These Sieves are made with parallel or bevel bar, and guaranteed to be well seasoned yellow deal, and not common spruce so generally used.
N.B.—Specimens sent free on application.



DEMPSTER'S
RENOWNED
WOOD SIEVES,
WITH TAPER BARS,
MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, NEAR HALIFAX.



THE PATENT
CATOPTRIC LAMP
for Streets and all Situations where the Light ascending above the level of the Lamp is wasted,
Is now in use in Moorgate St., London, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
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GAS AND WATER PIPES.
WILLIAM MacLEOD & Co.,
METAL MERCHANTS AND CONTRACTORS,
18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES AND FURNISHINGS.
MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.
AGENTS FOR THOMAS GLOVER & CO.'S
PATENT DRY GAS-METERS.
DELIVERY F.O.B. ON CLYDE.
Lists on application.

OXIDE OF IRON.—
We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
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BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
Agent in London, Mr. J. MANWARING, 101 Cannon Street E.C.

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(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
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SOUTHWARK, LONDON, S.E.,
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

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BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Successors to
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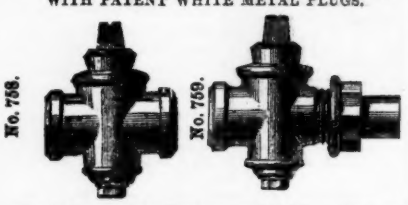
WALTER MABON & CO.,
Engineers,
ARDWICK IRON-WORKS,
FAIRFIELD STREET, MANCHESTER,
MANUFACTURERS OF
IRON TANKS, GASHOLDERS,
GAS APPARATUS,
PIPES, VALVES, IRON ROOFS,
WROUGHT AND CAST IRON GIRDERS.
DESIGNS, SPECIFICATIONS, & ESTIMATES FURNISHED.

GAS COMPANIES
AND
LOCAL BOARDS
Requiring New Street-Lamps are recommended
KEEN'S PATENT
DOUBLE-CLIP
STREET-LAMP.
A great improvement on the old-fashioned 14-in. Lamps.
They have been sold to various Gas-Works throughout the country and abroad, and the highest satisfactory testimonials are given as to their superiority.
For particulars of price, &c., apply to
WILLIAM KEEN, Sole Proprietor and Manufacturer, Robertson Street, HASTINGS.

LAMBERT'S
CAST-IRON GAS-MAIN COCKS,
WITH PATENT WHITE METAL PLUGS.



The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.
GAS-JOINTS, CHANDELIERS, PENDANTS, BRACKETS, ETC.;
WROUGHT-IRON WELDED TUBE AND FITTINGS,
BRASS, COPPER, LEAD, TIN, AND COMPOSITION TUBING,
Stocks, Taps, and Dies, and Every Description of Gas-Fitters Tools; Gas Slide and Sluice Valves;
CARTER'S SAFETY GAS-VALVES;
GAS-STOVES, REGULATORS, BURNERS, &c.
Pattern-Book and Price List of Gas-Fittings, supplied on application.
THOS. LAMBERT & SONS, Lambeth, London, S.E.

F. & C. OSLER,
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MANUFACTORY AND SHOW-ROOMS:
BROAD STREET, BIRMINGHAM.
ESTABLISHED 1807.
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.
TABLE GLASS OF ALL KINDS.
CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ORME & CO.,
GAS-METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,
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CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.
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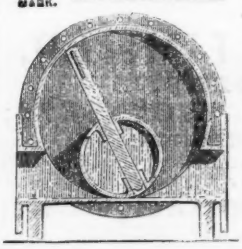
And every Description of Gas Apparatus.
GAS, STEAM, AND WATER FITTINGS.

J. BEALE'S
PATENT
GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.
MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise.
Estimates and Prices on application to
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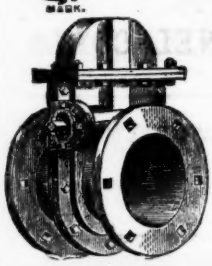
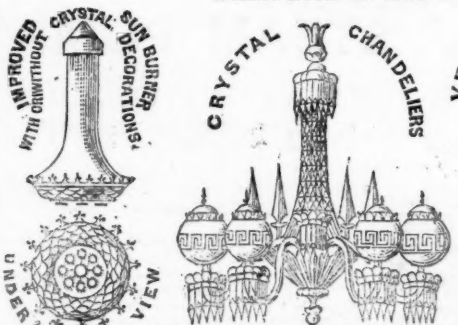
ENGINEERS & IRONFOUNDERS,
BERMONDSEY, LONDON, S.E.

B. DONKIN & CO.'S
IMPROVED GAS-VALVES



WITH WROUGHT-IRON PINIONS,
List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.
These Valves are all proved on both sides to 30 lbs. on the square inch before leaving the works, and are always kept in stock.
VALVES MADE WITH OUTSIDE RACKS TO ORDER.
ALSO,
SCREW WATER-VALVES WITH GUN-METAL FACES.
B. DONKIN & CO.,
GENERAL ENGINEERS AND IRONFOUNDERS,
MAKERS OF STEAM-ENGINES,
BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

TO GAS COMPANIES AND THE TRADE.
J. DEFRIES & SONS,
MANUFACTURERS OF
CRYSTAL, BRONZED, & ORMOLU CHANDELIERS, IMPROVED CRYSTAL STAR & SUN LIGHTS, VESTIBULE LAMPS, AND THE PATENT CRYSTAL ILLUMINATION.
A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
WORKS: LONDON AND BIRMINGHAM.



GAS MOONS,
Cut and Engraved, of the newest designs;
GAS REFLECTORS
In Silver and Glass;
GAS NIBS
AND
BURNERS
Of every description.
Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.
City Show-Rooms and Manufactory, 147, HOUNDSDITCH, LONDON.
ESTABLISHED 1830.

OLD WEMYSS CANNEL COAL.—Yield of gas per ton, 12,896 cubic feet; illuminating power, 31·75 standard candles. Port of shipment, Wemyss.
Analysis and price on application to Mr. WM. CAREY, Manager, Wemyss Colliery, Kirkcaldy, FIFE.

THE
HUCKNALL COLLIERY COMPANY
Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
Prices and information on application to the HUCKNALL COLLIERY COMPANY, Hucknall Torkard Collieries, near NOTTINGHAM.

POPE & PEARSON'S GAS COAL.—We have now the authority of several of the most eminent Gas Engineers of London in stating that our Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
For further particulars, apply to POPE AND PEARSON, West Riding and Silkstone Collieries, near LEEDS.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

THE MIDLAND COAL COMPANY
Are prepared to enter into CONTRACTS with
CORPORATIONS & GAS COMPANIES
FOR SUPPLIES OF
GAS COAL & CANNEL.
Prices, Analysis, and other information on application at the
MIDLAND COAL OFFICES,
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ROBERT MARSHALL,
CANNEL COAL MERCHANT,
173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.
MUIRKIRK, No. 1, CANNEL
Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.
MUIRKIRK, No. 2, CANNEL
Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing only 11 per cent. of ash.
RIGSIDE CANNEL
Yields 11,900 cubic feet of 35-candle gas per ton. Coke worthless.
Prices and full Analyses on application.

SCOTCH CANNEL COALS.
The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
JAMES M'KELVIE,
CANNEL COAL MERCHANT,
HAYMARKET, EDINBURGH.
Established 1840.

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COAL OWNERS & MERCHANTS.
Chief Office:
9, LANCASTER PLACE, STRAND, LONDON, W.C
SOLE VENDORS FOR
LONDON & THE SOUTHERN COUNTIES
OF
WIGAN COAL AND CANNEL,
From the Mines of the
INCE HALL COAL & CANNEL COMPANY, Limited,
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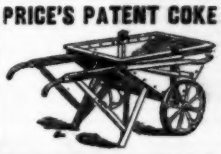
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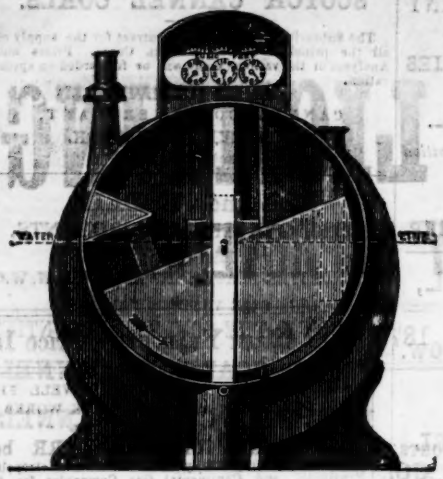

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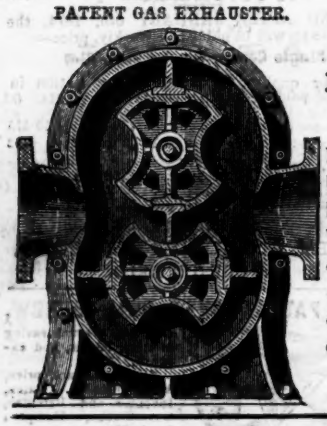

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